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What One Foundryman Thinks of Another

A Letter from an Old Brass Foundryman to William J. Reardon, Without Guile, Fear or Restraints

By OTTO GERLINE
Gerline Brass Foundry Company, Kalamazoo, Mich.

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

ADDRESSED TO BILLIE REARDON, HIGH MOGUL OF THE NATIONAL ALLOY COMPANY, DETROIT, MICH.

Several times you have told me that, away back before the Eighteenth Amendment, I promised to give you, or better still, write, myself in my own way, the story of my life, which you claim I could tell so interestingly, before said Amendment went into effect. I believe a good heading for this story would be, "The Biography of a Brass Molder," by "The Busted Pot." You know all great writers take a nom-de-plume, instead of using their own names. I think with the busted ankle I now have that "The Busted Pot" is a very appropriate name. I believe I will have it copyrighted, both here and in Ireland. The trouble is I don't remember ever making such a promise. Of course, you say I promised this before Mr. Butler had a brother officer arrested for inviting him to have a drink. If that is the case I can easily figure out why I can't remember it. What I can't figure out, though, is how the Devil you remember it. Is it because you are two months younger than I am or is it because you are two months older than I am? I have a faint recollection of one Foundrymen's Convention, which was held in Brother Charlie Vickers' city, namely, Buffalo, at which time you and I argued three days and three nights about this matter, and when we got through neither one of us was quite sure which was which. However, I will give you the benefit of the doubt and consider you the younger of the two.

I would like to see those Irish eyes a-smiling (that patented little smile of yours), with that scrubbing brush on your upper lip, when you read this.

Of course, in those days I made many promises, some for thirty days, some for ninety days, if they would take them. You may ask me how well I have kept these promises, and I can only answer you in the language of the Packard Motor Car Company, "Ask the man who owns one." You may also ask Mrs. G. I used to make her a lot of promises in those days too. At the same time you do not have to press this part of it. You know I will keep my promises to you, Billie, but the price having advanced to twelve and fifteen pesos per fifth, it seems that I cannot earn money enough in the jobbing brass foundry business any more to get in the humor to do it. In fact I am getting the "just as soon as" habit. Just as soon as I get this done; just as soon as I get something else done, and just as soon as that is done, I will do something else, if you know what I mean. However, I will now let you into a secret. My sister's husband was appointed a Prohibition Agent a month ago, and, "believe you me," quoting Nina Wilcox Putnam, things look better to me and I believe that I will get started on that story in a short time. You know that it has always been my ambition to become a great writer of biographies of great men; you know, a biography writer like Bigelow Paine or Rupert Hughes, if you know who they are. If you don't, you may wait until young Mr. Reardon leaves Harvard and he will be able to explain to you. I could easily surmise that such writing as this is far beyond you. Now, I don't want to be a writer like you are, or Charles Vickers, or Pat Dwyer. Your work is entirely too easy. All you fellows have to do is to sit down and answer a few foolish questions asked by tramps like me, and others; some better and some worse.

We may send you a piece of metal or a casting that is composed of a mixture of metals that the Lord Himself only knows; that has been handled in a way that you know absolutely nothing about; that may have been remelted often enough to burn the life out of it; that may have contained aluminum, and the aluminum burned out of it; that may have contained an overdose of iron; that may have been poured too hot or too cold; that may have been poured into mud or dust; in other words too wet a sand or too dry a sand. We don't have to tell you how the casts were gated or chilled, or if the proper risers

were put on it, but we will sandblast these so they all look alike on the outside and then all you have to do is look at them and tell us the trouble we have with them. It will not be necessary for you to make an analysis; neither will it be necessary for you to make a physical test. All we ask of you writers is to be mind readers and tell us what we want to know. Even though you may spend an hour or more looking up references; even though you may have spent thirty-five to forty years at the business to learn these things, all we ask of you is the answer to our problems. **And we will not tolerate any mistakes.**

Now, anybody can be a writer of that sort, but that isn't the kind of a writer that I am aiming to be. I want to be a much greater writer than that. Oh, I forgot to mention that in case you do make a mistake in answering our questions, we reserve the right to abuse you fellows to our heart's content, because we know that the salaries you get for this work are enormous. This may sound a little like George Bernard Shaw, but it's all right and he himself you know is Irish, like yourself.

Of course, once in a while you may find a fellow that will sit down and spend a few minutes to dictate a letter to his stenographer, thanking you for your services, and telling you honestly that you helped him, and that you saved him money, and will tell your employers so, and Oh, what a grand and glorious feeling when you receive such a letter. I know just how you feel Billie. I don't get many of them myself in my line of business. However, I believe that most of us mean to do this. But as I stated above we have the "as soon as" habit. As soon as we need you again we mean to tell you about it, and then we forget to do it.

I cannot help but think, Billie, how nice it would be if we foundrymen would hand each other at least a daisy or a little buttercup while we are alive, instead of that enormous and expensive bunch of American Beauty roses, or lilies, when we are dead.

In all sincerity, I would like to state right here that the writings of such men as yourself, Charles Vickers, Doctor Anderson, Mr. Bierbaum, Mr. Corse, John Buchanan, G. H. Clamer, Mr. Gillett, and others too numerous to mention here, deserve an awful lot of credit and the thanks of all brass foundrymen in the country; especially us little fellows who have not the capital or facilities to go into research work.

It is right here that I regret that I lost my parents at an early age, and had to do without a whole lot of schooling, because I cannot express my thanks to you fellows in the way that I would like to. However, you can rest assured that it comes from the bottom of my heart.

Now as to this story of my life and brass foundry experience, which extends over a period of about forty-six years, I don't know if anybody would be really interested in it. No doubt some of the parts of it were pretty sad for me and some of them very comical. All in all, I am satisfied. I am now getting and always did get a kick out of the brass foundry business, and life in general. Whether your people would stand for printing anything like that I leave that to you, and to them. If this letter is no good, no doubt you have a good waste basket in your office, and you have my consent to use it very liberally.

In my writing, of course, I have the advantage over some of you writers, since my sister's husband has been appointed a Prohibition Agent, as I stated before, and you would be surprised how small your troubles get and how large your income gets after visiting with my sister's husband for some little while. Of course, all our sisters' husbands cannot be prohibition officers, and that's where some of you fellows lose out. However, both you and Charles Vickers are living nearer the Canadian border line than I am, and maybe you are just as well off.

Now as to the terms of these articles, I read at one time that Teddy Roosevelt got 7c. a word for writing his African experiences, and I am sure that I have met just as wild people in my brass foundry experience as Teddy met in the darkest of Africa. Of course, if this price is too high you can cut it down to suit yourself. Since I have been in the jobbing brass foundry business I have become thoroughly accustomed to this. In fact I would be willing to do this work at a slight loss, provided I could get my picture in the Metal Industry, the same as you did a while ago. Competition is keen in our line now, however, and as a brass foundry proprietor you are no doubt thoroughly acquainted with this fact. And inasmuch as the Hon. Senator James Cousens of our State has flatly refused to sponsor my pet bill for the protection of jobbing brass foundries, to go through as joker, or a rider, or a chauffeur, or whatever you call it with the Farm Relief bill, I would like to earn a little extra money on the side, so as to keep the sheriff at a distance.

I hope you will accept this letter in the same spirit as I write it to you, and as I have your picture sitting on my desk before me, with that Irish grin of yours, it will be worth the trouble to me if that grin just broadens a little more than it does in the photo.

In conclusion I would say that these articles will be patented and the translation into the following languages copyrighted; Irish, Swiss, Hindu, Hottentot, Swahilli and Bowery. This ought to cover nearly all people interested in my stuff.

I will now close as my stenographer is getting cramps in his right hand, and his smile is slowly disappearing from his face.

As ever your friend,
OTTO GERLINE (The Busted Pot).

Analysis of Zinc Alloys

Q.—Can you give me any information on the following? I make up various alloys, using a zinc base and containing also tin, lead, aluminum and a little copper. In machining castings made from these alloys, the chips are mixed. When reducing the chips to ingot form, the mixture must be determined to use the ingots correctly. Is there any way whereby I can determine the quantity of each metal in the ingots I get without going through the regular chemical analysis?

A.—There is no known method of determining the quantities of the different metals when smelted and poured in ingots composed of zinc, tin, lead and aluminum except by chemical analysis.

However, if you know the materials you are mixing, your man can judge by fracture and color. For example, if the ingot shows aluminum in the mixture this can be told by the way the metal pours and by the color of the ingot. If high in zinc, it can be told by the color. Your experience will tell you approximately the mixture but not so close that you can use it for a definite mixture. This can only be determined by chemical analysis.

For white metal such as solder there is a gravity test that can be made by using the Richard testing machine. Otherwise, there is no method we know of.

W. J. REARDON.

The Fundamentals of Brass Foundry Practice

A Description of the Basic Laws Which Control the Melting and Casting of Metals and Their Application to Practical Foundry Work*—Part 17

By R. R. CLARKE
Foundry Superintendent

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

BOTTOM GATING

Bottom gating is a method of delivering metal at or near the mold's bottom and is realized in a variety of ways, of which the horn gate, the underflow gate, and the inclined gate are the most common. The horn gate (A Fig. 57) is designed to curve under the casting to the desired point of attachment. It is sometimes used also not only as a bottom gate but also to reach some inside casting point not otherwise approachable. To be

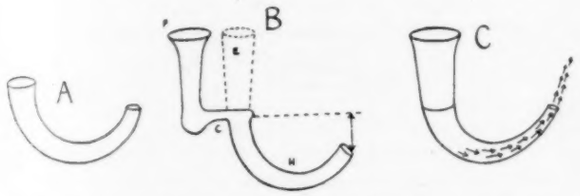

FIG. 57—A. HORN GATE. B. POURING GATE. C. EFFECT OF DIRECT AND HAND POUR ON HORN GATE.

correct the horn gate must be of that size, taper and curve as will allow ample volume of flow, ease of manipulation and sufficient body of sand between it and the casting such as will safely resist the metal pressure.

By its very principles the horn gate is a nozzle gate that in its natural position will under pressure deliver a violently spouting stream of metal to the mold which may attack some surface of the mold, as the cope surface, and wear it away. For this reason safer practice is to place the pouring sprue at a distance from rather than directly over the horn and connect the two with a checking connecting gate. Another arresting method is to invert the horn, large end on the casting, small end at the mold parting. This plan will not satisfy principle, as will be pointed out later in connection with the form and volume of gates. A similar weakness appears in B of Fig. 57 where the connecting gate C sizes down to freezing very shortly after the pouring finish depriving the horn metal of the pressure and feeding of the pouring sprue metal. This frequently results in an all-around bad condition but can be rendered by simply placing a riser or feed gate "E" directly over the horn as shown by dotted lines. Hydrostatics clearly affirm that any horn gate, or for that matter any bottom gate, out of communication with its pouring sprue exerts absolutely no pressure on the casting at or above its connecting level with the pouring sprue, and that maximum pressure of the horn at its attaching point is the perpendicular from that point to that connecting level.

By inverting the horn gate (D of Fig. 58) we get the diminishing volume of metal from the casting attaching point backward, which is an illogical gating condition, placing a heavy bulk of unsupported metal under the casting to possibly pull from the casting at that point regardless of any riser feed that may be used to hold the casting otherwise against shrinkage. At this point it might be opportune to note that as a general rule a heavy bulk of unsupported metal under a casting is a treacherous condition from the standpoint of shrinkage.

Horn gates are frequently used in the cope of the mold and attached to the casting top or parting surface as in E of Fig. 58. The advantage is that the metal in delivering clears the mold walls in its descent and is comparatively cleaner by virtue of the "trapping" principle of the horn so used. Possible objections in different cases are the nozzle effect and the violence of impact of the metal spouting perpendicularly downward under pressure to the mold bottom. In many instances, however, results have proven its value. It might be pointed out though that a bad condition can be realized if the pouring sprue P or the connecting gate C be undersized. In that event the metal in the heavier end of the horn might be induced to draw from, rather than feed to, the lighter end and the casting.

The pressure of metal at the delivering point of a horn gate in any position is identical with that of a horizontal gate of equal volume (as at H of Fig. 58) all things else

FIG. 58.—A. UNDERFLOW GATE. B. INCLINE BOTTOM GATE. C. HORIZONTAL BOTTOM GATE. D. INVERTED HORN GATE

being equal. The mere fact that the horn curves either up or down from a horizontal is entirely without effect. Thus the pressure of a filled gate at H is exactly the same as that of a filled gate at O except for the slightly lower point of attachment. The underflow (A of Fig. 58) is of special advantage in that it delivers metal more placidly and cleanly than the horn; the inclined or the horizontal gate at the same delivering level. It is further attractive because it can be made to reach any point in the casting from any sprue point. For these reasons the author has used it many many times in his experience and found it always dependable. The calm undisturbed rise of the mold metal and its cleanliness are particularly assuring. The gate can be constructed either altogether in a dry core or by the use of a dry covering core in which the gate channel is cut in green sand. In the latter method care must be used that green sand lying between the gate channel and the mold bottom be of that body and security as not to displace upward from the channel pressure.

The inclined gate is shown in B of Fig. 58 which is

* All rights reserved. This series will be collected and published in book form. Parts 1 to 16, inclusive, were published in our issues of July, August, September, October and November, 1926; January, February, March, April, May, August, September, November and December, 1927, and March, April and May, 1928.

self-explanatory. There is not much from principle to be said in favor of it. It is a quick easy way of doing the thing, whatever that might amount to. In metal cleanliness, etc., it is practically without recommendation. The bottom horizontal gate is shown in C of Fig. 58 and represents a very common method of bottom gating casting. It is in principle sound, and in practice efficient. Where the mold parts at the bottom point the gate can easily be cut at that parting. Where the mold does not part the gate can be realized by either an all dry core delivery gate or by the dry slab covering core as pointed out in connection with the underflow gate. In using the horizontal bottom gate it will generally be found better to cut it at a tangent rather than at right angles to the casting surface. This is true in nearly all cases and especially

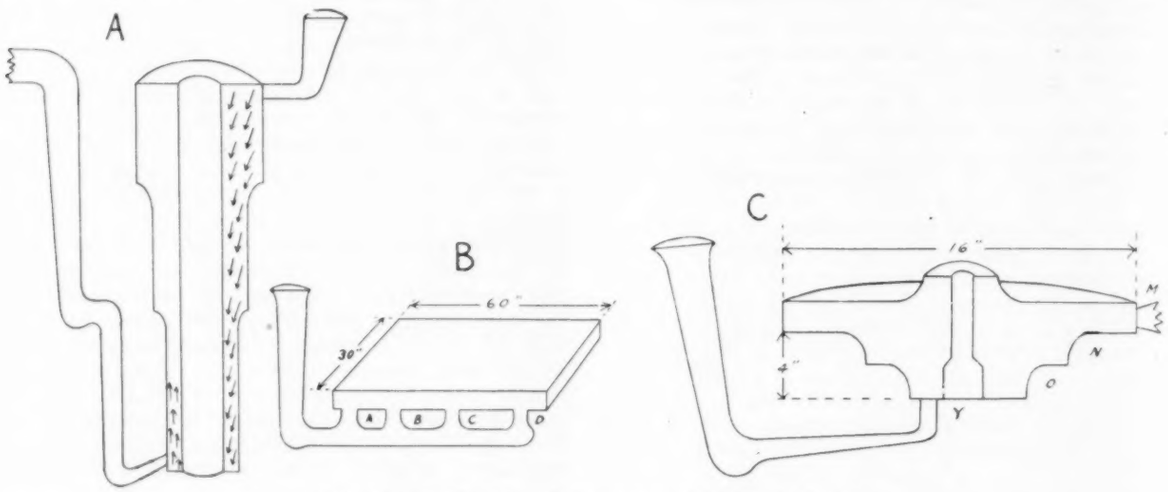

FIG. 59.—TYPES OF MOLDS WITH BOTTOM GATING

so if there are any core impediments in the mold to the delivering current. These impediments are often contributive to their own disintegration, to the "hot spot" and to metal turbulency, when subject to a direct and hard smash of metal current. When there are no impediments, that angle of delivery that is most conducive to quiet metal is the most suitable to the occasion. The laws of falling bodies already referred to will at once make clear the effect of dropping liquid metal perpendicularly downward through height.

Because of this effect it is always wisdom to keep drop sprue gates down to reasonable lengths. When the extent of descent is excessive the drop sprue gate should be broken as in F of Fig. 58. My own practice is never to drop metal unbroken over 24 to 30 inches.

Bottom gating applies principally to three types of mold, (1) those of depth, (2) those of expansive surface and (3) those treacherously disposed toward a horizontal flow or leap of metal. Fig. 59 will illustrate these three types. A represents the mold of depth which for reasons already pointed out, involving metal impact, metal partition, metal turbulency, etc., will at least pour better and more safely from the bottom up rather than the top down. B shows a mold of expansive flat surface, a mold surface peculiarly sensitive to the abrasive action of a trans-coursing metal stream. It contains 160 square inches of bottom surface, an expanse quite conducive to the rapid and voluminous formation of steam pressure in the sand, which is a disturbing factor together with the current action, and sets up the ideal condition for the peeling surface of the mold shown by the scabbed surface on the casting. It is also a mold surface where any horizontally delivered stream has a wide and free latitude for partition and for developing and collecting dross as well as free passage of dross into the casting. Now one or more bottom gates as at A, B, C, D (B of Fig. 59) will partly relieve the abrasive action, reduce the tendency to partition and exempt the entering metal of its included or collected dross. Any casting of this nature made in green sand and so poured will under otherwise identical practice have a much better chance than if its metal be delivered on the horizontal. Even in the skin-dried or the all-dried mold, the advantage is to greater or less degree present. In passing we pause to note that this is one of the instances where the horn gate, unchecked is distinctly prohibited on account of the action of the metal on the cope surface lying so close.

In C (Fig. 59) we note the treacherous condition of the inner mold part. A stream of metal sent horizontally in from any point, as at M, leaps recklessly down the mold sand at N and O and very often results in a scabbed or peeled surface at those points. Poured from the bottom as at Y, the conditions of delivery and current change greatly to the casting advantage. Other instances already pointed out are where the mold contains weak ridges, beads or pockets of sand, which cannot be level gated so as to relieve these weak and failing parts of the metal current action.

THIS SERIES WILL BE CONTINUED IN AN EARLY ISSUE.—ED.

Screen Plates for Paper Mills

Q.—We would like to know the formula that is used in bronze for the manufacture of screen plates used in the paper and pulp industry.

A.—We are of the opinion that bronze screen plates used in the paper and pulp industry is a rolled manganese bronze plate or Muntz metal. The analyses of these metals are given in a list of alloys prepared by William Campbell for Committee B-2 on non-ferrous metal alloys, American Society of Testing Materials:

Manganese Bronze		Muntz Metal	
Copper	59	Copper	60
Zinc	30.7	Zinc	40
Tin	1		
Manganese	0.3		

We would think, however, a far better mixture would be 93 copper, and 7 aluminum, as this alloy will withstand sulphites and acids better than any other alloy.

W. J. REARDON.

Defects in Fabricated Copper

A Discussion of Their Source and Prevention by Dr. Römer in Metallwirtschaft for October 25, 1927

Translated by WILLIAM ADAM, JR.
Electric Furnace Department, Ajax Metal Company, Philadelphia, Pa.

Until recently the causes of defects in the fabricated copper were not well known. There were difficulties with blistering, and evidence of tearing and cracking of the formed copper, but these were accepted by the purchaser so long as the defects did not occur too frequently and were not too glaring. If they were too frequent the purchaser diverted his business to another firm. These conditions have led the copper manufacturing and fabricating plants to investigate the causes of these "copper ills." The domestic and foreign metallurgical research during the past few years has been successful in tracing the causes of most of the defects and to eliminate them. Due to the uniformity with which the material is usually worked, it may be understood that the causes are already present to a great extent in the pre-worked material, and are never or only rarely introduced in the working process. Therefore, it is of vital concern to the producer to recognize these defects and to remedy or prevent them. But the knowledge of these causes are of as great economic interest to the caster, who must determine, by means of a suitable testing method, if the bars possess the desired properties for their intended purpose and are free of defects, that is, that they are sound. The known ills of copper, their causes, prevention and means of recognition will now be briefly discussed.

According to their causes, the copper ills may be divided into two groups, namely, those caused by foreign elements and those having their basis in the peculiarities of the structure.

DEFECTS OF STRUCTURE

In this latter group, the manifestation of tearing is mainly to be noted, which occurs surprisingly often in hot rolling American wire bars in wire mills using rhomboid* rolling for wire or round rod. The bar tears at the first or second pass, which in some cases, has led to as high as 90 per cent rejected material. The tears occur at the lower edge of the four-sided rods, for instance, as heavily split cross breaks, although longitudinal breaks may also occur. The first factor considered in determining the cause of this condition was an examination of the surface of the break. Several test pieces were taken at various points from such bars and given a metallographic examination. The specimen was crudely radiant at the outer parts and was composed of long, stellar needles, while it was comparatively coarse-grained in the center. Thus, such bars will tear, while those that are finely radiant and short-needled at the outer zones and fine-grained in the interior may be worked without difficulty. Therefore, the tearing is linked with crudely radiant or so-called "inter-radiated" material, and one can understand that these coarse needles, when subjected to the rolls, cannot withstand the stretching, and break apart due to their unfavorable position. The cause of such material is to be found in the method of casting. The extensive investigations by Czochralski show that the inter-radiated material always occurs when the molds are either too hot or too cold, while a low pouring temperature together with the medium warm molds give a medium to fine-grained material which insures good workability. Further investigations by Seidl and Schiebold led to the conclusion that not only the nature of the material but also the magnitude and arrangement of gas pores are responsible for the tearing. By comparing the pouring of bars and plates it will presently be shown that the cooling conditions in the different directions of the casting determined the shape and size of the crystals. Due to the cooling action of the mold walls, crystals begin to form on the bottom wall at the beginning of the pour when casting bars, which upon further filling grow as stem crystals toward the middle. In general, their magnitude depends upon the varying oxygen content and, therefore, the viscosity of the various local parts. In casting plates, the cooling proceeds rather evenly from the bottom and top of the mold, and the stem crystals growing from each end meet perpendicular to each other in an almost level plane at the center. Aside from this, all castings possess more or less characteristic casting strains, which may be determined by an X-ray examination.

EFFECT OF GASES

At first glance it appears that the pores, which are formed by the separation of the dissolved gases in the molten metal when freezing, are evenly divided throughout the mass of crystals. The gases here concerned are chiefly hydrogen, sulphur dioxide, carbon monoxide and hydrocarbons. Upon closer examination, one sees however, that there is a concentration of pores toward the top, i.e., the air cooled side, in both bars and plates. Consequently, for this reason the casting skin contains the most pores by far. Aside from this, the middle or granular zone contains the most pores, while the origin-crystals have a lesser content. Apparently, the pores found in the stem crystals in between are associated with the crystal position. Evidently, the gases are forced ahead by the crystal growth during crystallization, thereby enriching the granular zone. By cutting small pieces from the various zones, one can determine the density, which will be reduced with increasing porosity and which will give a specific gravity of the individual zones in the same order as the microscopic examination showed the porosity to be. The direct connection between the porosity of the material and its working properties was established by conclusive investigations, by means of pieces cut from different parts of the bars. The breaking strength is the lowest in the casting skin; it is greater in the stem crystal zones at the sides of the mold, and the greatest breaking strength is in the stem crystals at the bottom which also show the least pores. All of these values of breaking strength, which were taken from ordinary commercial copper were however, considerably less than—about two-thirds—the values shown in the fine-grained zones. Now, if these samples from the various zones are given a rolling

* Evidently refers to oval and square rolling.

test on a reduced scale, the casting skin zone will have much poorer deformation qualities than all the other parts of the bar. Seidl and Schiebold performed this test with cold rolling because the minute differences then became more pronounced. This method of investigation applies not only to the porosity but also the cuprous oxide content, of which more will be said later. These inequalities, together with the casting strains, which are present, are what cause the tearing at the first pass in hot rolling, which most frequently begin at the fragile casting skin. To overcome these faults, the casting procedure should be such as to give as homogeneous and fine-grained material as possible, which could be obtained by a quiet pour into heavily walled molds with every possible precaution against gases being taken up. On the other hand, the difficulties in effecting such technical control are not small. Therefore it is recommended that the casting be put through a recrystallization process before having any further work done upon it, in order that it possess the desired fine-grained structure. Such a treatment would necessitate mechanical stressing followed by an annealing operation. The mechanical treatment could be a 5-10 per cent one-sided pass. The annealing would require one to two hours at 750° C. However, this does not entirely eliminate the danger of large crystals again forming after recrystallization, due to the small amount of mechanical deformation. As an extreme, although not very economical, measure, the possibility of removing the specially dangerous casting skin, as well as the germ-zone† directly beneath it is suggested.

EFFECT OF CASTING CONDITIONS

The influence of the casting conditions on the metal and technical control was also studied by Siebe and Katterbach under actual operating conditions. They also arrived at the conclusion that if the casting conditions already mentioned above are adhered to, namely, medium mold temperature, and slow pouring at a low temperature, a fine grained and homogeneous material will be obtained. Furthermore, the size of the ingot mold has an influence on the material. Large castings always produce a more coarse structure than small ones, although this variation does not become very evident unless there is a comparatively great difference in the size of molds. The oxygen content is also of importance. The fact that oxygen in the form of cuprous oxide influences the properties of the copper, although the effect may be small, has been disputed for a long time, and even today is not cleared up. For example, Johnson has compared electrolytic copper free of all oxygen with ordinary pole refined copper. His results and also the work of Hanson, Marryat and Ford, show that the increasing oxygen content affects the percentage elongation as follows:

Oxygen Content	Percent Elongation Cold Rolled	Annealed	Percent Increase by Annealing
.015	20.4	58.0	184
.17	12.0	49.2	310
.282	7.0	38.0	443
.36	4.0	34.3	757

This decrease in tenacity due to oxygen content may be understood if one pictures that interior sliding of the copper crystals on their sliding surfaces is retarded by the small cuprous oxide crystals which lay in between. By annealing, and especially at the higher oxygen contents, the ductility is decidedly increased.

According to Johnson, an exterior indication of the oxygen content may be had from the wrinkled cicatrization on the top surface of the ingot, whose appearance will change with different degrees of poling. The wrinkled seams are due to the fact that the top surface layer which is rich in oxygen has a smaller shrinkage than the layer directly beneath it. Buttons taken during the "transition" period of poling (Siebe and Katterbach), that is, when there is still an eutectic content of oxygen, will have an even top surface with little wrinkling. Such direct samples, which are worked poorly due to their high oxygen content, will, however, have the greatest density and be free from cavities, and will have a coarse plaiting, which, upon decreasing oxygen content and up to a pole refined sample, becomes finer and finer until it has the characteristic long and fine wrinkling. If the heat is slightly over-poled the plaits become distinctly larger, and if the heat is heavily over-poled, the top surface of the button appears to be composed of closely bunched humps. Thus, the appearance of the top surface affords the operator a means of distinguishing copper of different degrees of poling, after a little practice. Good hot rolling copper must have a fine interior structure and show a fine wrinkling on the exterior. But the ills of oxygen in copper is not the question, since experience has shown that a certain amount of oxygen insures perfect conductivity. Copper containing oxygen is evidently unsuited only for cold rolling purposes. But even copper containing the desired amount of oxygen, for instance, the pole refined material will show spots in the finished article, which become evident only after polishing. Vigorous polishing will not remove them. These spots, which are the only significant damage done to copper by oxygen, are caused by the oxygen taken up in the casting when freezing so that a layer several millimeters thick containing cuprous oxide may be formed. This generally causes spots to form in the top surface after rolling. If the top surface of the bar is removed mechanically, the blemishes do not appear.

THIS ARTICLE WILL BE CONTINUED IN AN EARLY ISSUE.—ED.

† Evidently refers to the origin-crystal zone.

Refining Scrap Aluminum

Q.—Will you kindly advise us at the earliest possible moment in regard to the following problem. We are attempting to run down scrap aluminum automobile crank cases, borings, and old scrap kitchen utensils, in a reverberatory furnace. We use a reducing flame but loss is high. We have used chryolite and salt also sal ammoniac on dross just before pouring.

Would it be better to use above in furnace before putting in metal melting to a slag to act as a covering and, if so, should the slag be removed each heat or can it remain to act as covering for succeeding charge? Charge will be from 1,500 to 2,000 lbs. Any information as to best method for running down this metal into pigs will be appreciated. Also advise best method and flux and temperature on scrap aluminum castings and borings, also proportions of each heat 1,500 to 2,000 lbs.

A.—We suggest that you form a bath of metal in your furnace and cover with a slag of chryolite. Use your crank case stock to make the bath and puddle in your turnings. Work in as much turnings as your bath will take. This can be done with a long rabbling iron. Then turn on your heat again until the bath is hot enough to take up more turnings and scrap. In this way you will keep down your loss and refine your metal. Use a small amount of chloride of zinc when the aluminum is tapped in the receiving ladle and pour at as low a temperature as possible. Your furnace should be ideal for this work.

W. J. REARDON.

Sampling and Evaluating Secondary Metals

A Complete Description of the Precautions Necessary in Sampling Waste Material—Part 3*

By T. A. WRIGHT

Secretary, Lucius Pitkin, Inc., New York

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BATTERY LEAD OR PLATES

This consists of old wet batteries of the automobile and radio type, and the lead plus antimony will vary from 70 to 85 per cent. The antimony will run from 3 to 4 per cent as a rule. The container is usually not shipped and there is a marked tendency to cut off the lugs and sell separately. There is always more or less dirt but in the past most of the trouble has been from the moisture. Some have dried at 100 deg. C. (212 deg. F.) but the better practice today is to bake the sample.

On an average, the shipment will consist of lugs, connectors, plates, oxide and sulfate from the plates, and wooden or rubber separators. The separators will make up from 7 to 10 per cent of the wet mass and will show a moisture about 10 times as high as the plates and lugs combined. The lugs will assay about 96 to 98 per cent lead and antimony. An average lot of battery plates should contain around 8 per cent lugs; a lot may have none; if mostly whole batteries, it might show as high as 15 per cent.

The plates and oxides, then, make up the bulk of the material and the difficulty in sampling is to get a proper ratio of plates, lugs and separators; or liners, as the last are sometimes called. The proper procedure is to take every fifth or tenth shovel, as the case may be, and when the sample is drawn have it weighed. Break and cut off the lugs and weight to find out the percentage of lugs in the material. Break up and crush the plates and liners, mix and quarter down to approximately 100 lb. Then combine the proper proportions of lugs and plates for the melt sample. Of course, a reserve sample should be held and moisture run at a temperature high enough to drive off moisture and other volatile matter but not high enough to melt or sinter the sample.

The smaller the sample melted the more care must be taken, although if brought to a fine state of division a portion as low as 100 gm. may be melted in a clay crucible; the latter cooled and the button broken out and weighed. This practice is followed at the works of one of the large smelters and is probably the cheapest in labor, fuel and material.

Another works, which buys on metallic yield, melts from 250 to 350 lb. in a large kettle. The slag must be skimmed off and the metal ladled out into bars. The cost is high and the time long.

Trade practice in general calls for "metallic yield," "metallic button," "metallic recovery" or "metallic" (all four terms being synonymous) as the final operation of determining the value of battery lead and similar material; and there is little doubt that when properly carried out the results may be sufficiently near the truth. As mentioned before, the button is weighed and is assumed to be Pb + Sb. The slag is assumed to contain no more Pb + Sb than will be lost by the smelter in refining and is, therefore, disregarded in this method. Ordinarily then, there will be no necessity for analyzing the bottom or the slag. As a matter of knowledge, a 300-lb. sample, typical of the practice at one works purchasing on the metallic basis, was thus melted and assayed. The metallic, or button, was 78.10 per cent; the slag amounted to 6.78 per cent of the sample. The partial analyses of each and the calculations showing the comparative and composite values is given in Table 3.

Our experience is that on a large melt, the sample is more representative but the metallic yield is too low because of the character and amount of slag. Conversely, on a small melt, it is more difficult to obtain proper proportions of lugs, plates, liners and oxide but the slag is more apt to be relatively small and clean.

In another experiment in our laboratories, the total of the actual Pb + Sb was 0.50 per cent more than the metallic button run down on a large portion of the same sample.

Pb + Sb = 83.00 per cent vs. metallic button, 82.50 per cent.

The slag on the first sample was high in both lead and antimony. The slag on the second, as usual, was not saved and analyzed.

The better practice, therefore, in the opinion of our organization, is to melt from 50 to 100 lb. in a large crucible to a clean slag free from shot. The slag is skimmed and crushed. Either the melt is poured, the slag broken off and the bars sawed, or a dip sample of the metal is taken and poured into a small bar, which may be rasped down. The weights of both metal and slag are taken and both portions assayed for lead and antimony, payment being made on that basis, less the usual deduction and with a premium or penalty for plus a minus 80 per cent lead plus antimony.

Baking losses will run as high as 15 per cent, called

TABLE 3.—PARTIAL ANALYSIS OF TYPICAL 300-LB. SAMPLE

	Lead, Per Cent	Antimony, Per Cent	Tin, Per Cent	Arsenic, Per Cent	Copper, Per Cent	Iron, Per Cent
Analysis						
Bar	94.54	4.85	0.23	0.10	0.00	0.27
Slag	39.57	2.93	1.01	1.33	1.75	4.28
Reconciliation						
Bar (78.10 per cent)	73.83	3.79	0.18	0.08	0.00	0.21
Slag (6.78 per cent)	2.68	0.20	0.07	0.09	0.12	0.29
Sample	76.51	3.99	0.25	0.17	0.12	0.50

	Per Cent
Metallic yield — lead + antimony + impurities	78.10
Lead plus antimony as assayed	80.50
Difference	2.40

* Parts 1 and 2 appeared in the issues of June and July, 1928.

"moisture," but most contracts specify or allow 1 per cent. The average is 5 to 7 per cent.

TIN AND TERNE DROSSES, SKIMS AND ASHES

Tin drosses are often sold on the basis of "metallic button" or "recovery." They may contain as high as 35 per cent moisture and much zinc and ammonium chlorides. In this wet condition they are in the form of a thick sludge and the sample is best taken while barrels are being loaded. A sample of 10 per cent or 5 per cent should be sufficient. (Another method of drawing is to pour off the water, mix and take a pipe sample of the sludge.) After mixing thoroughly the sample is placed in two-quart glass jars, covered tightly, and both barrels and sample are weighed. The sample is then sent to the laboratory and washed thoroughly by decantation, dried and weighed. It may be then passed through a set of laboratory rolls, sieved through a 40-mesh sieve and the metallics or scales weighed. The pulp or fines is best taken by difference. If sold on "metalic button" by the "coal" method, disagreements are minimized by making a joint assay in the presence of both buyer's and seller's representatives.

COAL METHOD

Proportionate amounts of fines and scales, together with a flux made up of soda and hard-coal dust, are mixed in a small crucible. Four times as much flux as samples is taken and the latter may be from 100 to as much as 400 gm. Triplicates are made up and melted in a gas, coke or oil furnace. The melt, when not cooled in the crucible, is preferably poured into a flat bar rather than a button. If it is to be analyzed, raspings are better than sawings. Segregation in bars, from drosses containing antimony and lead, is marked, so the raspings should be thoroughly mixed. As a matter of fact, at least two melts should be taken and averaged. The slag is ignored. Results are low but are claimed to be in line with smelter recovery. As much as 4 to 15 per cent of tin may be lost.

CYANIDE FUSION

The cyanide fusion is less often used to ascertain the metallic button and is carried out in a manner similar to the old determination in tin ores, using twice as much cyanide as sample. It is not suitable for terne drosses. A more accurate method is to screen the sample through a 40-mesh screen after reducing. A cyanide fusion on 10 gm. in triplicate will give a button on the fines, which may then be rasped down.

If much iron is present the button will have hard spots and care must be taken again to avoid segregation. The coarse screenings will be of a scaly character and usually brittle. They may be further cut and broken down, riffled or melted under a flux or with resin, cast into a bar, weighed and rasped or sawed. Correction must then be made for the melting loss.

Iron is an impurity and may be penalized. If present in sufficient quantity the determination can be made only by a wet method on the original material. Lead is also best assayed in a similar way.

MOST ACCURATE METHOD

The most accurate method of all for such material is the one employed on solder drosses and sweated radiator dross. This consists of melting 20 to 60 lb. of a suitably prepared sample with soda and charcoal, in a graphite crucible or large ladle. The slag is crushed and ground and the bar may be sawed lengthwise and one-half rasped down. Both bar and slag are assayed.

ZINC ASHES, DROSSES AND SKIMMINGS

These may be very wet and full of salts such as zinc and ammonium chloride or they may be dry with practically no chloride. They are sold on "sample," the latter being often but a grab wrapped in paper, whether wet or dry. Determination is always required for the total zinc content and often for the moisture and chlorine, the latter being penalized. In sampling, care should be taken to obtain the proper proportion of metallics and fines. The sample is best bottled.

LAMP BASES

This material consists of the scrap from electric-light bulbs. The glass from the bulb itself is usually present in only a small amount, but that from the inner tube in which the wires are sealed will be present in varying amounts in the shipment. A base will consist of four parts, the ratio by weight of each part being as follows:

	Standard Type 1 In. Diam. Per Cent	Large Tape 1½ In. Diam. by Weight
Brass shell	20	25
Wax or plaster	49	37
Glass tube	30	37
Lead-in wires	1	1

The material is sometimes shipped "as is." The copper content will vary from 5 to 30 per cent, although the brass assays 66+ per cent copper.

Some shippers crush to remove as much glass and wax as possible, and such lots may assay as high as 50 per cent.

ELECTROTYPE SHELLS

Often sweated before shipping, they still run high in lead, and in the past payment was not, as a rule, made for that metal. They are now at times sold for both copper and lead contents and must be sampled on that basis. On casting, the two metals will separate in two layers. The lead portion will be fairly pure lead; the copper portion will contain more or less lead and, of course, impurities.

LEAD-COVERED CABLE

Whether called "lead-covered cable" or "copper-filled cable lead," payment is made for the actual copper and for the lead plus antimony.

The cable is best stripped by hand or machine and the lead and wire portions melted separately. The former will show a low melting loss, the A. M. weight being taken as the Pb + Sb + Sn.

The copper portion, being stranded wire covered with insulation and coated with tar or similar material, will give a high melting loss. Shippers cannot understand why payment is not made for copper on the A. M. weight, as on the lead; obviously, copper melted and cast into a sample bar will contain considerable oxygen, to say nothing of other metallic impurities.

CARBON BLOCKS

Carbon blocks are made usually in four copper types ranging from 70 to 85 per cent. The "pig-tails," or stranded wire sometimes attached, will assay around 96 per cent. Almost all of the blocks and dust will show appreciable amounts of lead and possibly tin. They will assay from 69 to 79 per cent, rarely over 75 per cent.

They must be melted with a flux containing niter, to oxidize the corbonaceous matter, or loses in melting are apt to be high, on account of dusting.

This material may be ground in a jaw-crusher and roll-crusher but this is not advised, because, unless extraordinary care is taken in cleaning the apparatus, it might result in salting some other samples. The fine powder is not necessarily dusty of itself.

THIS PAPER WILL BE CONCLUDED IN AN EARLY ISSUE.—ED.

Smelting Secondary Aluminum and Aluminum Alloys

A Series of Articles on the Reclamation of All Forms of Scrap and Used Aluminum and Aluminum Alloys. Part 8. Blending Methods in Secondary Smelting.*

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WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

In the operation of a secondary aluminum smelting plant, it is normally practice to purchase quantities of different kinds of scraps which are available on the market. The economical disposal of lots of miscellaneous scraps of various compositions is a matter calling for considerable experience in blending. The problem confronting the secondary smelter, then, is the production of various grades and compositions of aluminum and aluminum alloys from different lots of scraps of widely varying compositions.

As mentioned in the first article of this series, the chief kinds of scraps available to the secondary aluminum smelter include the following: drosses and skimmings from melts; new clippings and punchings from punch-press and stamping operations; painted sheet; old (plain) sheet from various sources; discarded aluminum utensils; new aluminum "hay" from beading and trimming operations in producing various articles; old aluminum wire; foil; small stamped and pressed articles which have been discarded; borings and old castings. Drosses and skimmings may come from melts of commercially pure aluminum or from different alloys; clippings may be either aluminum or an alloy; and castings are normally alloy. The bulk of the drawn utensils are made from commercial aluminum sheet, although a considerable number are made from the alloy containing 1¼ per cent manganese. Borings arise in the machining of aluminum alloys.

In utilizing a lot of scrap in the secondary plant, the first step is to determine the chemical composition. Lots of scrap as purchased on the market may be very variable as to nature and composition. Thus, a lot may consist of all clean commercial aluminum clippings which have been baled. Or, it may consist of so-called "old sheet aluminum" and contain utensils, painted sheet, molding, castings, wire, and most forms of aluminum and alloy scrap. In this latter case, it is necessary to carefully sort the lot and segregate the different kinds of scraps.

Taking a given quantity of scrap, assumably all of the same kind, the proper procedure is to sample the lot, securing a sufficiently large sample. This sample is run down in a small furnace, poured into ingots, and drillings taken for analysis. Suitable disposition may be made of the lot on the basis of the analysis.

SAMPLING OF SCRAP LOTS.

Prior to about 1920, the great bulk of the sheet, utensil, and stamping scrap on the market consisted of 99+ per cent aluminum, while more than 95 per cent of the castings were No. 12 alloy. This refers to the United States. Drosses were either from aluminum or No. 12 alloy melts for the most part. Blending practice was consequently not nearly so important as at the present time, and sampling for chemical analysis was often not necessary. With the advent of alloy sheet of several compositions and a large variety of special alloys for castings, the necessity for careful sampling and analysis of the bulk of all lots received has become apparent. At the same time, skillful blending is now normally part of the every day work of the smelter. Of course, where lots of known composition have been purchased regularly from given sources over a considerable period of time, sampling and analysis of every lot are not ordinarily practiced by the smelters. However, it is certainly advisable to analyze all incoming lots as a matter of routine.

The constitution and evaluation of aluminum and aluminum-alloy scraps have already been discussed in some detail in the third article of this series. The point to be stressed in the present article is that determination of the chemical composition of scrap lots is a necessary prerequisite to blending. Where the sorting costs of mixed scrap might be too high or the lot cannot be readily picked over to yield a representative sample for analysis, it is advisable to melt the entire lot. Samples may then be taken from the melt for analysis.

BLENDING IN THE PRODUCTION OF SECONDARY ALUMINUM.

Secondary 98-99 per cent aluminum is made by smelting aluminum skimmings or the concentrates from drosses, by remelting commercially pure aluminum clippings, old utensils, sheet, and the like. Or, any two or more of these scraps may be blended together in a furnace operation.

Secondary 94-98 per cent aluminum such as is made for steel deoxidizing in the form of small notch bars or shot may carry up to 6 per cent total impurities, and may be made by blending various scraps. Thus, assuming that a specification for this material called for 96 per cent minimum aluminum with maximum 0.3 per cent zinc, and that the scraps available for making it include painted sheet, casting scrap, and duralumin clippings, an example may be given to show the method of blending. The chemical compositions of the scraps and the quantities on hand may be taken as shown below:

	Elements, per cent							Quantity on hand
Material	Cu	Fe	Si	Mg	Mn	Zn	Total metals*	lbs.
Painted sheet	0.12	0.48	0.31	nil	trace	0.05	0.96	11,200
Casting scrap	7.64	1.12	0.40	0.09	0.02	1.47	10.74	6,400
Duralumin clippings	4.21	0.62	0.35	0.58	0.61	trace	6.37	2,200

* Other than aluminum.

The melting losses on these scraps may be taken as follows: Painted sheet, 13 per cent; casting scrap, 5 per cent; and duralumin clippings, 4 per cent. The actual losses sustained in practice depend, of course, on various factors including the condition of the scraps and the furnacing. In the blending, it will be assumed that the attempt will be made to use as much of the casting scrap as is readily feasible, and that the duralumin clippings constitute an odd lot which it is desired to dispose of. A 10,000-lb. heat is to be made, i.e., this quantity is to be poured. Simple calculation then shows that a heat may be blended as follows:

* Parts 1, 2, 3, 4, 5, 6 and 7 were published in our issues of January, 1925, September, 1925, February, 1926, May, 1926, November, 1926, July, 1927, and November, 1927, respectively.

MATERIAL	POUNDS
Painted sheet	7,830
Casting scrap	1,560
Duralumin clippings	2,080

In the above, allowance has been made for the losses of the different scraps on melting, the loss being taken as oxidation of the aluminum, burning off of paint, and slagging of dirt. The total zinc content of the resultant melt should not exceed 0.27 per cent, and the total impurities not over 3.75 per cent. The confines of space prevent presentation of the detailed arithmetic involved, but sufficient details will be given below in discussing alloy blending to show the method of calculation.

BLENDING IN THE PRODUCTION OF SECONDARY ALUMINUM ALLOYS

Various secondary aluminum alloys may be made by proper blending of scrap lots. So-called ordinary "casting aluminum," sometimes sold as No. 12 alloy, is often made by simply melting down miscellaneous casting scrap. The resulting compositions of different melts are naturally very variable.

An example will show how blending is done in the preparation of a given grade of No. 12 alloy from several different kinds of scrap. It may be assumed that it is desired to produce an alloy containing 7 to 7.5 per cent copper, maximum 1.25 per cent iron, maximum 1.5 per cent zinc, maximum total other impurities 0.7 per cent, and remainder aluminum.

The chemical compositions of the several materials available for the blending, together with the quantities on hand, are given in the subjoined table:

	Elements, per cent.								Quantity on
Materials	Cu	Fe	Si	Mg	Mn	Zn	Ni	Total metals*	hand lbs.
Ingots run from casting scrap.	5.31	1.08	0.90	0.10	0.07	1.35	0.07	8.88	5,500
Dry borings..	7.44	1.26	0.34	0.04	0.02	1.90	0.02	11.02	22,100
Rich skimmings	0.18	0.69	0.41	nil	0.04	0.24	nil	1.56	4,600
Clippings	0.09	0.54	0.36	nil	trace	0.06	nil	1.05	2,400
50:50 copper-aluminium alloy	49.80	0.22	0.14	nil	nil	nil	nil	50.16	2,000

* Other than aluminum.

The 50:50 copper-aluminum alloy is a standard hardener used for making fixed additions of copper to aluminum-alloy melts.

The melting losses on these several scraps may be taken as follows, based on experience with the particular types: Ingots run from casting scrap, 2 per cent; dry borings, 10 per cent; rich skimmings, 15 per cent; and clippings, 4 per cent. In the blending, it will be assumed that it is desired to dispose of the bulk of the casting scrap ingot and to use as much of the borings as is feasible. A 20,000-lb. heat is to be made. Calculation shows that an alloy of the desired composition can be obtained by blending the following, allowance being made for the losses on melting:

MATERIAL	POUNDS
Ingots run from casting scrap	5,100
Dry borings	11,100
Rich skimmings	3,530
Clippings	2,080
50:50 Cu-Al alloy	690.8

From the materials above used, the approximate composition of the resultant alloy would be expected to be about as follows: Copper, 7.25 per cent; iron, 1.16 per cent; zinc, 1.45 per cent; and total other metals (not including aluminum), 0.65 per cent. This would meet the specifications aimed at. In the smelting process, one method of furnacing the scraps would be to charge first the ingots (run from casting scrap). After these are melted, the borings could be puddled in with suitable fluxing, and the slag removed. Then, the rich skimmings could be charged with proper fluxing, and the bath again skimmed. Finally, the clippings would be charged, and the addition of 50:50 copper-aluminum alloy made. Or, the ingots, clippings, and 50:50 copper-aluminum alloy could be melted first, then the borings puddled in, and finally the skimmings added.

If calculation is made for the quantities of the alloying metals present in the several scraps, excluding the 50:50 copper-aluminum alloy, the data shown in the subjoined table arise:

	Quantity charged,	Pounds metals present						
Material	lbs.	Cu	Fe	Si	Mg	Mn	Zn	Ni
Ingots run from casting scrap.	5,100	270	55	45.9	5.1	3.6	68.9	3.6
Dry borings....	11,100	828	140	38.7	4.4	2.2	210.9	2.2
Rich skimmings.	3,530	6.4	25.4	14.5	..	1.4	8.5	..
Clippings	2,080	1.9	11.2	7.5	..	..	1.2	..
Totals.....	21,810	1106.3	231.6	106.6	9.5	7.2	289.5	5.8

On the basis of 20,000 lbs. of metal recovered, the chemical composition of the blended melt would then be as follows: 5.53 per cent copper, 1.16 per cent iron, 0.53 per cent silicon, 0.05 per cent magnesium, 0.04 per cent manganese, 1.45 per cent zinc, and 0.03 per cent nickel. The copper content is raised by adding the required quantity of the 50:50 copper-aluminum alloy. With proper calculations and sufficient experience with the losses obtaining in smelting different grades of scrap, the final chemical composition of alloys made by blending can be pre-determined with considerable accuracy.

In making some specification alloys from scraps, it may be necessary to blend in a quantity of 99 + per cent primary metal in order to reduce certain impurities below given maxima. Thus, taking the case of an alloy to contain 4.5 to 5.5 per cent silicon, 1.5 to 2.5 per cent copper, maximum iron 0.8 per cent, and total other impurities 0.2 per cent. It may be assumed that the following materials are available for the blending:

	Elements, per cent.							Quantity on
Material	Cu	Fe	Si	Mg	Mn	Zn	Total metals*	hand lbs.
Ingots run from utensils and old sheet	0.21	1.12	0.33	trace	0.06	0.14	1.86	8,340
Dross concentrates	0.04	0.69	0.42	nil	0.03	0.02	1.20	2,600
50:50 Si-Al alloy.	0.01	0.41	50.45	nil	nil	nil	50.87	2,100
50:50 Cu-Al alloy	49.80	0.22	0.14	nil	nil	nil	50.16	1,700
99+ per cent primary aluminum.	trace	0.31	0.22	nil	nil	nil	0.53	2,690

*Other than aluminum.

The melting losses on the scraps listed above may be taken as follows: Ingots run from utensils and old sheet, 2 per cent; and dross concentrates, 37 per cent. Losses on the hardeners and on the primary aluminum are taken as 0.5 per cent. In the blending, the entire quantity of dross concentrates will be used, as much of the ingots (run from utensils and old sheet) as feasible, and 99+ per cent primary aluminum will be used to dilute the iron content. The copper and silicon contents of the final alloy will be adjusted by proper additions of 50:50 copper-aluminum and 50:50 silicon- aluminum hardeners. A 10,000-lb. heat is to be made. By calculation it is shown that an alloy of the required composition can be made

by blending the quantities of the several materials given below:

MATERIAL	POUNDS
Ingots run from utensils and old sheet.....	6,120
Dross concentrates.....	2,600
50:50 silicon-aluminum alloy.....	1,005
50:30 copper-aluminum alloy	402
99+ per cent primary aluminum.....	967

From the materials above used, an alloy having the following approximate composition would be obtained: Copper, 2.14 per cent; iron, 0.76 per cent; silicon, 5.37 per cent; and total other metals (not including aluminum), 0.13 per cent.

The quantities of the various metals present in the blended materials on the basis of the amounts used for the alloy are shown in the following table:

Material	Quantity charged lbs.	Pounds metals present					
		Cu	Fe	Si	Mg	Mn	Zn
Ingots run from utensils and old sheet..	6,120	12.9	56.3	20.2	..	3.7	8.6
Dross concentrates...	2,600	0.66	11.3	6.88	..	0.49	0.33
50:50 Si-Al alloy....	1,005	0.10	4.1	507.0	..	....	....
50:50 Cu-Al alloy....	402	200.2	0.9	0.56	..	....	....
99+ per cent primary aluminum	967	....	3.0	2.1	..	....	....
Totals.....	11,094	213.86	75.6	536.74	..	4.19	8.93

On the basis of 10,000 lbs. of alloy recovered, the chemical composition is readily apparent from the total quantities of the various metals contained.

The materials to be blended in making up any given alloy depend necessarily on the quantities and compositions of scrap lots on hand, the required composition of alloy to be made, and the quantity desired.

Blending methods similar to those indicated above are used in the production of intermediate aluminum alloys of various compositions.

The ninth article in this series will deal with the types of furnaces used in secondary aluminum work.

THIS SERIES WILL BE CONTINUED IN AN EARLY ISSUE.—ED.

Impurities in Brass

Q.—With this letter we are sending you a brass stem. You will notice that it is quite rough on one side and we are interested in knowing just what might cause this. So far as the casting of the brass was concerned, this same trouble came up on nearly all of the stems on the order from which this sample was taken. They were cast from four or five different crucibles and were also moulded at different times, so that different sand must have been used.

It does not appear to us that the machining would be at fault, although we know that where the mill is forced ahead too fast for the feed of the machine it makes a very rough cut. If you can give us any information regarding the cause of the trouble we shall appreciate it very much indeed.

A.—On examination of the sample casting furnished, we are of the opinion that there is some foreign material in your mixture and suggest you have analyses made for antimony. There is a separation of some form in the alloy that is coming either to the top or bottom. It may be phosphor slag if you are melting in open flame furnaces. However, your letter seems to indicate you melt in crucibles. If you will examine your castings showing conditions similar to sample furnished, under a glass, you will see very clearly the defect is in the alloy. Could it be possible you are using genuine Babbitt as tin? At any rate, your casting shows segregation or slag. Have analysis made for cause of difficulty. W. J. REARDON.

Die Casting Alloys

Sub-Committee 15 of Committee B-2, of the American Society for Testing Materials is engaged in an investigation of the properties of Die Casting Alloys. The investigation has not been finished, but the following is a list of the alloys agreed upon with their nominal compositions.

LIST OF ALLOYS AGREED ON FOR DIE CASTING INVESTIGATION, WITH NOMINAL COMPOSITIONS DESIRED

Aluminum Base Alloys

Number	Copper, Per Cent	Silicon, Per Cent	Nickel, Per Cent	Iron, Per Cent	Alumium, Per Cent
I	4	..	..	1½ to 2	Balance (94)
II	10	..	..	1½ to 2	Balance (88)
III	14	..	..	1½ to 2	Balance (84)
IV	..	5	..	1½ to 2	Balance (93)
V	..	13	..	1½ to 2	Balance (85)
VI	2	3	..	1½ to 2	Balance (93)
VII	4	5	..	1½ to 2	Balance (89)
VIII	1½	¾	2¼	1½ to 2	Balance (94)
IX	4	1½	4	1½ to 2	Balance (89)
X	..	2	5	1½ to 2	Balance (91)
XI	2	8	..	1½ to 2	Balance (88)
XII	8	1	..	1½ to 2	Balance (89)

Zinc Base Alloys

	Copper, Per Cent	Aluminum, Per Cent	Magnesium, Per Cent	Tin, Per Cent	Zinc, Per Cent	Grade of Zinc Based on A.S.T.M. Specification, B6-18
XIII ...	5.0	0.25	..	..	Balance (94.75)	High grade
XIV ...	3.0	4.0	..	..	Balance (93.0)	High grade
XV	3.0	4.0	0.1	..	Balance (92.9)	High grade
XVI ...	3.0	4.0	0.1	..	Balance (92.9)	Horsehead†
XVII ..	3.0	3.0	0.3	..	Balance (93.7)	High grade
XVIII ..	3.0	0.5	..	6.0	Balance (90.5)	Prime West

†Special grade, lead and cadmium together, permissible maximum, 0.06%; tin, none; zinc minimum 99.94%.

Sorting Scrap Metals

Q.—I wonder if you could help me in some of my problems or refer me to some sources of information? I am interested in sorting scrap metals and would like to know of simple tests that I can show my men for testing zinc, tin, babbitt, solder, aluminum, monel metal, red brass, lead, bronze, etc. On the babbitt and solder I would like to know how to make the simple gravity test by weighing in water and air so as to get some idea of their composition without resorting to a chemical test. If there are any abrasion tests for brasses and bronzes I would like to know of them. If you could refer me to any text on the above I would appreciate it.

A.—For the work sorting scrap metals, the man in charge should possess considerable experience. Only by this means can he learn the sorting of scrap metals. Zinc is told by color and fracture. The fracture shows the zinc crystals.

We suggest you secure a slab of new zinc, tin and lead. All scrap is judged by color and fracture. Show your men the color, name and fractures of these metals. Copper is a red color and soft. Red brass is soft and dull red. Hard brass high in tin is hard and a light red color. Yellow brass is soft and yellow. Manganese bronze is yellow and hard, showing some color as a lemon. Babbitt and solder can be tested by the Richard gravity testing machine. You cast a button and the tin, antimony and lead can be told approximately.

Your best method would be to employ a man that has had a few years experience on this line of work, as scrap metal today contains all kind of metals and it takes a man familiar with the work. There is no standard method of sorting scrap.

W. J. REARDON.

Nickel Anodes and the Acidity of the Solution

A Short Summary of an Extended Experiment with Nickel Anodes as to pH Change

By R. G. SUMAN

At the Dayton Electrotype Company

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

The object of this experiment was:

(1). To find out why a nickel solution would have a tendency to go either acid or alkali.

(2). After determining the above, to discover a remedy.

(3). To ascertain the proper amount of chlorides.

(4). To decide upon a good nickel solution for electrotypers.

The try-out and experiment was done on a large production scale and not as a small laboratory experiment, and lasted over a period of ten months.

The solutions were run in lead lined tanks of 175 gallon capacity. The solution used was

9 oz. single nickel salts
.7 oz. ammonium chloride
1 gallon water.

The solution was kept at about 85° F. and a voltage of 3½ volts maintained. This brought the amperage to about 10 amp. per sq. foot. Analyses were taken every week for nickel content and chlorides. Nickel salts of the finest quality that could be purchased on the open market were used in two tanks with 90-92 anodes, and one with 99% cast.

The solution used was given out by the Bureau of Standards, but presumably it could not be used by 99% of the electrotypers due to changes of some kind. This try-out proved that the solution was all right.

It was noticed that the 90-92 anode tank would run acid, while the 99 cast would run alkaline. The solutions were brought to a 6.1 pH every morning and the day's work would be turned out all right. However, on the next morning the solution would be either acid or alkaline.

Then the anodes were reversed in the tanks. The tank containing the 90-92 anodes that had run acid was interchanged with the tank that had run alkaline. This changed the solution to the acid side, where previously it had run alkali. The same change came about in the 99 cast anode. In other words, the composition of the anodes changed the solution either to acid or alkaline. These tanks were run this way for a long time to notice any further changes.

The anodes were then changed 50/50 or in other words 50% of the 99 anodes were removed from their original tank and placed in the other tank, and vice versa with the 90-92 anodes. Then the pH was changed either by aqua ammonia or sulphuric acid to a pH 6 or 6.1. This seemed to keep the solution in a more stable position. As the chart on page 351 indicates, a check was kept on this for quite a time and by manipulating the anodes the ph could be controlled or changed to suit.

A re-checking of this tryout was made and it will be noticed that the anode seemed to be one of the controlling features in the nickel solution. It was also thought that if more nickel were maintained per gallon of solution, it would have a tendency to change the pH value, but this made no difference; the result was the same whether it contained 1 or 2 oz. of metallic nickel per gallon.

The .7 of an ounce of salammoniac seemed to keep the corrosion on the anodes in good shape as the analysis of metal content was fairly well balanced.

In the tank that had run alkaline, it was thought that possibly if boracic acid were used it would keep, but there was no apparent change, nor did reducing the amount of anodes make any change in the pH reading. It seemed that the purer the anode the more alkaline the solution—the more impure the anode the more acid the solution.

What actually causes this change has not been definitely worked out, but we have found by this try-out that we can change the pH in the solution by the composition of the anode. It is a question whether 95-97 anodes would keep the solution at a more stable position. By studying the chart, and the simple manipulation of the composition of the anodes, the plater, as well as the electrotyper can no doubt work out a stable solution control.

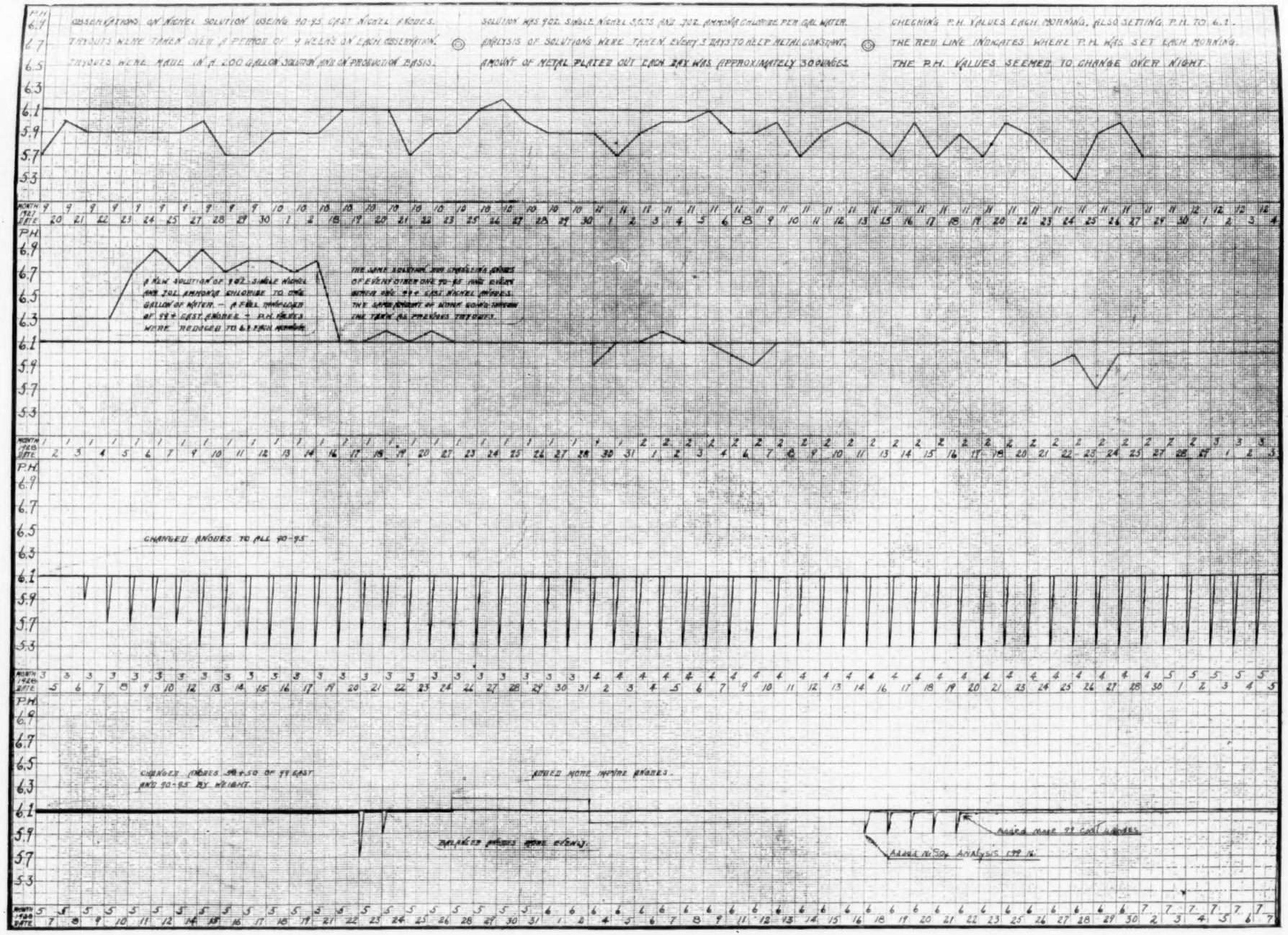
It has been found that a 6.1 solution is the most efficient point of a nickel solution. Solutions can be maintained at 6.8 but the deposit is somewhat coarse grained, which means a softer plate and, therefore, not possessed of very good wearing qualities on the press. The solution running at 5.9 is somewhat hard and close grained, caused by gassing; or in other words, the small holes caused by hydrogen gas collect on the plate.

Removing Nickel and Copper Plate

Q.—I would like to know how to remove nickel and copper from metals. I need to remove such coatings from revolvers and replace them with gun metal finish. I have succeeded in removing most of the copper, but it sticks in little spots.

A.—The best method to use to remove a deposit of copper and nickel from steel is to polish the article on a polishing wheel, using emery paste as the polishing medium. You might try stripping the nickel off with a sulphuric strip composed of sulphuric acid 66°, one gallon; glycerine, one ounce; water, ¼ gallon. In preparing this strip solution add the water to the acid (not the reverse). Let solution cool to room temperature and use reverse current with lead cathodes and 6 volts. You can, also, remove the small spots of copper with a reverse current in a solution made of 6 oz. sodium cyanide, water 1 gallon. Use at 140° F. with 6 volts. If time will permit, the hot cyanide solution without the current will remove the copper deposit; it will take considerable longer.

—OLIVER J. SIZELOVE.


OBSERVATIONS ON NICKEL SOLUTION USEING 90-95 CAST NICKEL ANODES.
TAYOUTS WERE TAKEN OVER A PERIOD OF 9 WEEKS ON EACH OBSERVATION.
TAYOUTS WERE MADE IN A 200 GALLON SOLUTION AND ON PRODUCTION BASIS.
SOLUTION WAS 9 OZ. SINGLE NICKEL SALTS AND 7 OZ. AMMONIA CHLORIDE PER GAL WATER.
ANALYSIS OF SOLUTIONS WERE TAKEN EVERY 3 DAYS TO KEEP METAL CONSTANT.
AMOUNT OF METAL PLATED OUT EACH DAY WAS APPROXIMATELY 300 AMPS.
CHECKING P.H. VALUES EACH MORNING, ALSO SETTING P.H. TO 6.1.
THE RED LINE INDICATES WHERE P.H. WAS SET EACH MORNING.
THE P.H. VALUES SEEMED TO CHANGE OVER NIGHT.
P.H.
6.9
6.7
6.5
6.3
6.1
5.9
5.7
5.3
MONTH 1927
DATE
A NEW SOLUTION OF 9 OZ. SINGLE NICKEL AND 7 OZ. AMMONIA CHLORIDE TO THE GALLON OF WATER. — A FEEL TAKEN OF 99 + CAST ANODES & P.H. VALUES WERE REDUCED TO 6.1 EACH MORNING.
THE SAME SOLUTION AND CHARGING RODS OF EVERY OTHER DAY 90-95 AND EVERY OTHER DAY 99 + CAST NICKEL ANODES. THE SAME AMOUNT OF WORK GOING THROUGH THE TANK AS PREVIOUS TAYOUTS.
MONTH 1928
DATE
CHANGED ANODES TO ALL 90-95.
MONTH 1928
DATE
CHANGED ANODES 50 + 50 OF 99 CAST AND 90-95 BY WEIGHT.
ADDED MORE IMPURE ANODES.
BALANCED ANODES MORE EVENLY.
ADDED MORE 99 CAST ANODES.
ADDED NiSO4 ANALYSIS 1.99 %
MONTH 1928
DATE

A GRAPHIC RECORD OF OBSERVATIONS ON A NICKEL SOLUTION

The Stencil Etching Process

A Method for Etching Stencil Designs or Patterns in Relief on Brass, Copper, Bronze and Steel.

By JOHN R. BAYNES
Expert Etcher

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

While this process may be used for fairly fine relief work, it is particularly adapted for broad, open effects, where large metal surfaces are to be covered with decorative designs of a scroll character. It can be used very effectively for the decorating of metal panels, frames, doors of bank vaults, and various articles having curved surfaces, such as urns, vases, etc.

To produce stencil etchings a soft lead stencil should be used. The best metal for the purpose is a heavy sand blast foil.

To make a stencil, take a sheet of thick glass as large or a little larger than the size you intend the stencil to be. Lay the glass on a flat board or table and coat it with a very thin asphaltum varnish. For this take six ounces (6 ozs.) of liquid asphaltum (such as is made by any of the leading varnish manufacturers), to which add, for thinning the varnish down, two ounces (2 ozs.) of commercial benzole and two and one-half ounces (2-½ ozs.) of commercial turpentine.

With a varnish reduced in this way, the glass and also a sheet of the sand blast foil of the same dimensions as the glass should both be very thinly coated on one side. To do the coating use a flat camel-hair brush. Just as soon as the glass and foil have been covered with a thin coat of varnish in this way, the foil should be carefully lifted up and placed, varnished side down, directly over the varnished surface of the glass, thus bringing the two varnished surfaces in contact. The foil is then rubbed gently down with a small piece of cloth and a few drops of turpentine.

One end of the foil is now pulled slowly back from the varnish coated glass until half of the coated surface of the glass and foil are exposed to the air. While the varnish is exposed in this way, it should be fanned with a piece of card till the varnish becomes sticky, and when in this condition the foil is placed back in its original position on the glass by rubbing it carefully down with the turpentine cloth, starting to rub from the center to which the foil has been pulled back, and continue rubbing with the cloth across the full width of the foil until it is forced back firmly to the coated surface of the glass from which it was pulled. The other end of the foil is now pulled slowly back to the center of the glass and is fanned until the varnish becomes sticky and is rubbed back on the glass in exactly the same manner as described above for the replacing of the first section. If the foil has been properly put on the glass it will be free from wrinkles and perfectly flat.

The foil having been fastened to the glass as per above directions, is then coated over with thin asphaltum. The same kind of thin varnish as was used for fastening the foil down will answer this purpose satisfactorily. The object of the coating this time is to remove the sheen from the bright foil so that the designer or cutter of the stencil can see his work plainly.

When the coat of varnish has become dry, the design may then be drawn or traced directly on it, after which it is cut by a sharp engraver's tool or the point of a fine knife blade. Whatever tool is employed for this work, it is necessary to use enough pressure to cut through the foil to the glass. Lead foil being soft will cut readily.

After the stencil has been cut, it can be removed from the sheet of glass. The proper way to do this is to place the glass, with the newly cut stencil on it, in a shallow pan and cover it with kerosene oil and then place this pan containing the stencil and oil in another vessel containing hot water. In a few minutes the kerosene will become quite warm and the stencil can be readily removed by lifting it up by the corners. The kerosene can now be blotted from the stencil by placing it between two sheets of paper.

The metal article to be etched must be made thoroughly clean by scrubbing with powdered pumice stone or otherwise. It is then covered with an ordinary coat of asphaltum varnish and put in some warm place which is fairly free from dust, and allowed to dry.

A very thick soap paste is now required and should be prepared in the following way:—

Take sixteen ounces (16 ozs.) of fresh yellow laundry soap (Higgins' or Babbitt's soap will do very well) and cut it up into rough cube-like pieces of about one-half inch or even smaller. Place the pieces thus cut in a tin or enamel pan, add seven fluid ounces of water and proceed to mash the soap with a potato-masher or a clean piece of wood with a flat end. Keep mashing until the soap and water form a thick paste-like mass and is free from all lumps. Take some of the soap that has been worked up in the above manner and apply it over the dry asphaltum varnish with a small dabber made of cheesecloth. Dab the soap paste on in such a way as to distribute it thinly and as smoothly as possible. While the soap paste is moist, place the stencil on it, in the position required, and rub it down in perfect contact, by the use of a smooth rounded piece of wood. Some small tool handle will answer very nicely for the purpose.

After the stencil has been fastened to the varnish in this way, take a soft sponge that has been made slightly damp with water and wipe it gently over and around the stencil to remove any of the soap paste that is not actually holding the stencil in place. It is very important that the sponge shall not be wet, but just moist, for if it contains much water it is apt to dissolve and wash away some of the soap that is intended to and should remain between the stencil and the asphaltum varnish if the cleanest and sharpest etchings are to be attained.

The superfluous soap having been removed by the sponge, the stencil and varnish are then ready for the brushing, which should be done as follows:—Take a small, stiff bristle brush having bristles of even length, moisten the brush with a few drops of turpentine or kerosene oil, and commence brushing over the stencil with a small circular movement of the brush. The brush during this operation must be held in a vertical position

to prevent the bristles getting under the stencil. In a few seconds it will be found that the turpentine or kerosene has started to dissolve the varnish which is seen through the perforations of the stencil. It will also be noticed that the brushing is loosening up the varnish as fast as it dissolves. Continue the brushing, adding to the brush from time to time a few more drops of either of the oils mentioned. Very soon the action of the brush and the oil together will loosen up all the asphaltum varnish in which they have come in contact, and the metal that has been covered with it will be plainly seen through the openings or perforations of the stencil. When all the asphaltum has been softened and loosened, wash it off with soap-suds and a soft sponge.

The stencil can now be taken up and the soap which held it in position on the varnished surface of the metal may be washed off with clean cold water, exposing the stenciled pattern in asphaltum varnish upon the metal to be etched.

Any exposed parts of the metal which are not supposed to be etched must be protected before being placed in the etching solution. A simple way to protect such places (which might be the sides, edges, back or bottom of the article) is to use melted parafine or bees-wax, which can easily be applied with a small flat brush. The necessary protecting having been done, the article may be placed in the etching bath and etched.

To etch steel, use the following formula:

STEEL ETCHING BATH

Nitric Acid	32	ounces
Muriatic Acid	3	"
Denatured Alcochol	6	"
Water	96	"

For the etching of articles made of brass, copper, or bronze, use perchloride of iron, full strength, the strength at which it is manufactured and sold in carboys for etching purposes. To obtain the best results with these etching solutions, the etching should be done in a warm place, and the solutions kept well agitated during the process of etching.

When the article has been etched to the required depth, remove it from the etching solution, rinse in cold water, and then place in hot water until the parafine or wax is melted, after which take it from the hot water, and while hot clean off the remaining asphaltum with a cloth and commercial benzine.

Protecting Rubber Cord

Q.—I have been referred to you, regarding information as to the best means of making rubber cord (sample of which I am enclosing) of about ⅛ in. diameter proof against oily substances and the like. We have tried copper and silver plating this cord, but due to the fact that the plating flattens out when the cord passes over a sheaves about 8 in. in diameter, this method could not be used for the purpose. No doubt, could suggest some oil proof material other than metal for coating the cord that would be sufficiently flexible to allow the cord to pass over the sheaves and at the same time adhere to the rubber without cracking or peeling off.

A.—The best method to protect the rubber cord against oily substances would be to apply a coating of bakelite lacquer. This could be done by dipping and if this material came on spools an arrangement could be made, whereby the rubber cord could be unwound from the spool, lacquered, and passed through a medium drying oven and rewound on another spool.

The sample has been dip lacquered in bakelite lacquer and air dryed. If satisfactory, a sample of the lacquer may be obtained from the Bakelite Corporation, Bloomfield, N. J.

OLIVER J. SIZELOVE.

Excessive Chloride in Nickel Solution

Q.—I am sending you a sample of my nickel solution. When I plate with this solution, the finish that results has a milky, bluish color. I have tried to eliminate this defect by the addition of sodium sulphate, but there has been no noticeable improvement. The plate, when applied on copper, brass and other metals, is difficult to buff and it spots out frequently. The pH of this solution is now 5.8, according to my test. I have made additions of single nickel salts, nickel chloride and nickel fluoride in order to bring up the metallic content to equal that of solutions in other tanks where work is satisfactory. However, compared with the work that comes out of the other tanks, the plate produced in the solution under consideration looks as though it had been painted with a thin white paint. Can you advise me of some means to correct this?

A.—Your sample of solution analyzes as follows:

Metallic nickel	4.58 oz.
Chloride (as ammonium chloride)	8.52 oz.
Acid content	2.01 cc ammonium hydroxide

We believe that most of your trouble is in the chloride content, which is twice what it should be. Perhaps your pH instrument needs rechecking as we do not find a pH of 5.8 or a corresponding pH with the tritration method, which, we think, is more accurate than the pH method.

We do not advise the use of either nickel chloride or nickel fluoride in a nickel solution. An excess of nickel fluoride will cause the deposit to become chalky. Nickel chloride, if pure, would be an ideal salt to use, but we have failed to find any that did not contain large quantities of iron and copper.

We would suggest that you dilute the solution one-half and add 1 cc. of ammonia hydroxide per gallon. Try this on a small scale and watch the results.

OLIVER J. SIZELOVE.

Chromium Plating Solution

Q.—Please send me a formula for preparing one gallon of chromium plating solution. I have some articles such as wrist watches which need to be replated with chromium after a hard-soldering operation which tends to discolor the original plate. What is the best book or article on such work?

A.—Formula for chromium solution:

Chromic acid	33 ozs.
Sulphuric acid	3 oz.
Water	1 gallon

Temperature, 113°F.; amperage, 1 to 2 per sq. in.; voltage 4 to 5; use lead anodes.

This is the formula for chromium solution that is used by the Bureau of Printing and Engraving at Washington, D. C. We would suggest that you write to the Director of the Bureau of Standards, Washington, D. C., for a copy of Technologic Paper No. 346. This paper contains valuable information on chromium plating and will be of help to you.

OLIVER J. SIZELOVE.

Influence of the Cathode on the Electrodeposition of Chromium

Experiments on the Influence of Passive Nickel, Active Nickel, Copper and Lead on the Composition of Chromium Solutions

By DR. HIRAM S. LUKENS
Professor of Chemistry, University of Pennsylvania

A PAPER PRESENTED AT THE FIFTY-THIRD GENERAL MEETING OF THE AMERICAN ELECTROCHEMICAL SOCIETY, HELD AT BRIDGEPORT, CONN., APRIL 26, 27, 28, 1928

In previous studies of the conditions necessary to the successful deposition of chromium from solutions consisting primarily of chromic acid and a chromic salt[1], it has been shown that the current density must differ when one metal is substituted for another as cathode. In addition, the appropriate current density required may be determined by the manner in which the metal surface was prepared, for example, whether cast, wrought or rolled, or formed by electrodeposition. The experience of the writer confirmed the observations reported by Haring and Barrows and suggested a further investigation.

In attempting to deposit chromium from electrolytes, such as those studied in the articles to which reference has been made, it was observed that chromium could only be deposited within very narrow limits of current density when cathodes of electrolytic nickel were used. The cathodes had been prepared by depositing nickel on a plane wax surface that had been coated with graphite to render it conductive. When nickel of sufficient thickness was deposited, the application of hot water to the nickel served so to loosen the metal from the wax that it could easily be removed. In order to deposit chromium on the nickel surface that had been adjacent to the wax, it was necessary to employ some sort of abrasive material to remove the outer film of metal, otherwise chromium could only be deposited with the greatest difficulty, if at all. Microscopic examination of the surface gave little indication of any difference between this metal and the characteristic structure of electrolytic nickel. In chemical properties, however, it differed materially from the opposite surface of the sheet. Moderately concentrated nitric acid had no effect on it for a long time. It was not rapidly attacked by ammoniacal hydrogen peroxide, and toward solutions containing nickel ions, it exhibited a potential characteristic of a metal far nobler than nickel. In short, it had all of the properties of a passive metal and, like passive metals, became active when subjected to the action of halogen ions. Chlorine water, acidulated solutions of hypochlorites, or an acidulated solution of iodine dissolved in potassium iodide rapidly destroyed the passivity, and chromium could then be deposited on the surface with no more careful control of current density than was required to deposit that metal on ordinary electrolytic nickel.

The formation of passive metal by electrolytic deposition at a cathode may suggest a choice between our theories proposed to account for passivity.

Iron that was rendered passive by immersion in nitric acid behaved in a manner similar to that noted with passive nickel. When the passivity of the surface was destroyed, chromium could be deposited, without difficulty, over a wide range of current densities.

Investigation of the conditions under which a chromium deposit could be produced on copper indicated that there was no detectable difference in the limitations of current density required for electrolytic, cast or rolled copper. In all cases a satisfactory deposit could be produced over a wide range of current densities.

The limiting current densities at which a satisfactory chromium deposit may be produced on lead are of the same order of magnitude as those for copper and nickel when the surfaces are equally clean. If there is any choice as to extent of range of optimum limits of current density, it is in favor of copper as cathode.

INFLUENCE OF THE CATHODE METAL ON THE CHANGE OF COMPOSITION OF THE ELECTROLYTE.

On subjecting the solutions used in the study to analysis, it was noted that the amount of chromic salt produced in electrolytes where lead had been used as cathode, was consistently higher than that observed where nickel or copper was used as cathode for the same number of ampere hours. In depositing chromium from a solution containing 250 g./L. of CrO_3 and 3.3 g./L. of $Cr_2(SO_4)_3$, so little of the current is utilized (from 7 to 17 per cent) in depositing metal under normal conditions that it seems likely that considerable reduction of chromic acid to chromic salt should take place in the vicinity of the cathode. That chromic salt does not rapidly accumulate in the electrolyte may be explained on the assumption that a reoxidation of chromic salt to chromic acid is constantly in progress at the anode. Such an assumption seems justified by the fact that lead anodes, having a high oxygen over-voltage, are superior to iron anodes, with a lower oxygen over-voltage, in maintaining the composition of the solution constant, insofar as chromic salt is concerned. It is further supported by the fact that large anode surfaces, insuring low current density, are favorable. The accumulation of chromic salt beyond a low limiting value soon so increases the over-all resistance of such solutions as to make it necessary to correct the composition.

To test the preceding assumptions, two rectangular glass jars were employed to hold the electrolytes. A cylindrical porous cup, 3.5 cm. x 10 cm., was placed in each jar. A coil of sheet lead, 7.5 cm. x 10 cm., was placed in each cup and an electrode of sheet lead, exposing a surface of 7.5 cm. x 7.5 cm., was hung in each jar at a distance of 7.5 cm. from the electrode within the porous cup. Each cell was then filled with 500 cc. of electrolyte, 50 cc. within each porous cup and 450 cc. outside. These cells were then connected in series with the lead sheet outside the porous cup serving as anode for one cell, and the lead sheet outside the porous cup in

[1] H. E. Haring, Chem. and Met. Eng., 32, 692 (Aug., 1925), 756 (Sept., 1925); H. E. Haring and W. P. Barrows, Tech. Paper No. 346, Bureau of Standards, June 10, 1927.

[2] Creighton, "The Principles of Electrochemistry," Wiley, 1924.

the companion cell serving as cathode. Glass coils were provided to keep the temperature constant in both by cooling water. Current was allowed to pass for a period of two hours at a current density of 13 amp./sq. dm., keeping the temperature constant at 45° C. That reduction took place about the lead sheet which served as cathode in one cell and oxidation took place about the corresponding electrode that served as anode in the other cell is apparent from the analyses summarized in Table I.

TABLE I

	Original Solution g./L.	450 cc. Anolyte g./L.	450 cc. Catholyte g./L.
CrO_3	289.98	316.90	277.68
$Cr_2(SO_4)_3$	6.00	6.18	5.87
Total Cr^{III}	8.8	4.0	13.2

To study the relative influence of the metals, nickel, copper and lead, as cathodes, the following experiments were conducted:

Three rectangular glass jars were provided as containers. A porous cup, 3.5 cm. x 10 cm., was placed in each jar to serve as anode compartment. Within each porous cup was placed a coil of lead sheet, 7.5 cm. x 10 cm., to serve as anode. Five hundred cc. of electrolyte consisting of 250 g./L. of commercial chromic acid and 3.3 g./L. of chromic sulfate were placed in each cell, the level of the electrolyte within and without the porous cups being the same. Cathodes of the metals, nickel, lead and copper, were prepared to fit each cell and when immersed in the electrolyte, a cathode surface of 7.5 cm. x 7.5 cm. was exposed in each case. The cells were connected in series, and the temperature of each solution adjusted to 45° C. Glass cooling coils were provided in each cell to make it possible to keep the temperature constant. After bringing the imposed potential of the electrodes to approximately the required value, the cathodes were simultaneously plunged into their respective electrolytes thereby closing the circuit and the current density adjusted as quickly as possible. The electrolysis was continued for one hour, keeping the current density and temperature constant. The cathodes were then removed and examined and the catholytes analyzed. The purpose of using two compartment cells was to ascertain the amount of chromic salt produced by the use of the metal serving as cathode, while eliminating as far as possible the effect of any reoxidation which might take place at the anode. Three series of experiments were conducted at a temperature of 40° C. The results are summarized in Table II.

TABLE II

Effect of Cathode Metal on Catholyte

		g./L. Cr as Cr^{VI}		g./L. Cr as Cr^{III}		
Metal Used as Cathode	Amp./ sq. dm.	Before Electrolysis	After Electrolysis	Before Electrolysis	After Electrolysis	g./L. Change in Cr^{III} Content
Electrolytic Nickel...	5.0	126.42	121.37	3.12	4.67	+1.55 (1)
Electrolytic Nickel...	10.5	130.08	128.59	1.12	1.49	+0.37 (2)
Electrolytic Nickel...	20.0	132.31	129.10	1.60	1.20	+0.40 (3)
Electrolytic Copper..	5.0	126.42	120.98	3.12	5.06	+1.94 (2)
Electrolytic Copper..	10.5	130.08	127.09	1.12	1.87	+0.75 (2)
Electrolytic Copper..	20.0	132.31	130.50	1.60	1.21	—0.39 (2)
Sheet Lead.....	5.0	126.42	120.98	3.12	7.78	+4.66 (4)
Sheet Lead.....	10.5	130.08	127.09	1.12	1.87	+0.75 (5)
Sheet Lead.....	20.0	132.31	128.10	1.60	1.60	±0.00 (6)

Appearance of Deposit: (1) Light gray, not brilliant. (2) Brilliant. (3) Not metallic, gun metal color. (4) Gray. (5) Light gray. (6) Very light gray.

Examination of Table II reveals the following generalizations:

The maximum amount of trivalent chromium is produced at low current densities, the least amount with nickel, a greater amount with copper and the greatest amount with lead.

The minimum amount of trivalent chromium is produced at high current densities.

Of the three metals, nickel, copper and lead, copper yields practical deposits over the widest range of current densities, nickel over the narrowest range.

The effects observed with the three metals are probably repated to their respective hydrogen over-voltages and the rapidity with which the metal surfaces become covered with chromium. While hydrogen over-voltage is influenced by current density and temperature changes, typical over-voltages[2] for the three metals may be expressed as nickel, 0.18 volt; copper, 0.35 volt; lead, 0.45 volt.

Since high hydrogen over-voltage favors the reduction of any reducible substance present in an electrolyte, it is easy to conceive that more chromic acid might be reduced at a lead cathode before it became covered with chromium, than would be reduced at a nickel or copper cathode under the same conditions, and apparently the amounts of chromic salt produced are in the order of the hydrogen over-voltages of the metals. With increasing current densities, the surfaces of the metals are the more rapidly covered with chromium and the over-voltage effects are reduced.

REOXIDATION OF CHROMIC SALTS

Mention has been made of the fact that when the concentration of chromic salt exceeds a low limiting value, the resistance of the electrolyte increases to a value prohibitive for practical use. To decrease the amount of chromic salt frequently offers a problem in the operation of such solutions. This may readily be accomplished by subjecting the solution to electrolysis, using as large an anode of lead as is practical and a small cathode surrounded by a porous diaphragm. The results that may be expected may be best illustrated by the description of an experiment.

A cell was set up in a manner similar to that previously described. The cathode of coiled lead sheet 7.5 cm. x 7.5 cm. was placed within the porous cup and a lead anode of 7.5 cm. x 7.5 cm. was used in conjunction with it. The volume of electrolyte was 500 cc. The temperature was kept constant at 45 deg. C. Anode current density was kept constant at 13 amp./sq. dm. Time of electrolysis, 2 hours. The results are recorded in Table III.

TABLE III

	Original Solution g./L.	Anolyte After Electrolysis g./L.
CrO_3	289.98	316.90
$Cr_2(SO_4)_3$	6.00	6.18
Total Cr^{+++}	8.80	4.00

CONTROL OF SULPHATE CONTENT OF ELECTROLYTE

Commercial chromic acid frequently contains sulphuric acid or chromium sulphate or other sulphates or bisulphates. Under certain conditions, the sulphate content of solutions accumulates to an undesirable extent. Excess SO_4 ions may be readily removed from the electrolyte by introducing an appropriate amount of an emulsion of freshly precipitated barium chromate. Barium sulphate is precipitated, and an equivalent amount of chromic acid enters the electrolyte. This suggestion was communicated to the author verbally by Dr. A. Kenneth Graham, of the Hanson & Van Winkle Company.

Palladium and Cadmium Solutions

Q.—Please give me information on preparing cadmium solution for plating on steel, and also for a palladium solution to plate on gold alloys.

I would also like answers to the following questions: Where can I get copies of the papers read at the Sixteenth Annual Convention of the American Electroplaters' Society, held at Toronto in June? Where can I obtain the book on electroplating by Dr. Blum and George B. Hogaboom?

A.—Formula for cadmium solution:

Sodium cyanide	7 oz.
Cadmium oxide	3 oz.
Caustic Soda	2 oz.
Water	1 gal.

Use 2 grams mercury cyanide for brightener; 80° F.; 2½ volts.

Formula for palladium solution:

Palladium as metal	1 oz.
Sodium cyanide	4 oz.
Water	1 gal.

Temperature 120° F., 2 to 4 volts. A palladium solution may be made in the same manner as a gold solution. Dissolve 1 oz. palladium in aqua regia, precipitate with ammonium hydroxide, wash and redissolve in sodium cyanide. The solution may also be prepared by using a palladium anode in a sodium cyanide solution with a porous pot.

Write to George Gehling, 5001 Edmund Street, Philadelphia, Pa., for papers read at the Toronto convention. The book by Blum and Hogaboom, known as "Principles of Electroplating and Electroforming," can be obtained from THE METAL INDUSTRY.—O. J. SIZELOVE.

Oxidizing Brass and Aluminum

Q.—Please tell me a method of oxidizing small articles made of brass and aluminum. I would rather do this without plating but if this is not possible, what is the complete method of plating, dipping, etc.? I want to make the articles look like copper or bronze.

A.—To oxidize brass or aluminum, the articles should be copper plated in a cyanide copper solution and then immersed in a sulphide solution, used either cold or warm depending on shade of color wanted.

Cleanse the articles with an alkaline cleansing solution (any one advertised in THE METAL INDUSTRY will do), then bright dip and plate in a cyanide copper solution for 10 to 15 minutes. After the work has been plated, rinse thoroughly in clean water and oxidize by using a solution composed of ½ oz. sulphuret of potassium to one gallon of water. Any shade from a light brown to a black can be obtained, depending upon the length of time the work is left in this solution. In answer to how to plate, we refer you to "Electroplating and Electroforming," by Blum and Hogaboom, a book which can be purchased through THE METAL INDUSTRY.

OLIVER J. SIZELOVE.

Satin Finish on Cast Aluminum

Q.—Would you kindly let me know, if possible, a method of obtaining a satin finish on aluminum cast parts? These parts are not plated.

A.—A satin finish can be obtained on both cast and sheet aluminum with a crimp steel wire wheel. The work should be put through a caustic soda solution, caustic soda 4 oz., water 1 gal., used at 150° F., then into an acid dip composed of sulphuric acid one part and nitric acid one part, then rinsed thoroughly and dried.

The crimp steel wire wheel should be 6 inches in diameter with .001 wire and used on a lathe that operates at 1200 to 1400 revolutions per minute.

OLIVER J. SIZELOVE.

Platinum and Rhodium Plating

Q.—I would like you to give me a good platinum, and a platinum and rhodium plating formula containing 10% of the latter.

I also would like to know if I can platinum plate a solid nickel knife to withstand a 15% sulphuric acid solution.

A.—Formula for platinum solution:

Platinum (as chloride)	12 pwt.
Ammonium phosphate	6 ozs,
Sodium phosphate	32 ozs.
Water	1 gal.

Dissolve each compound in water and the ammonium phosphate solution is added to the platinum chloride. This produces a yellow precipitate. Without filtering, add the sodium phosphate solution and boil until no odor of ammonia can be detected. Use a low voltage, 1 to 1.5; temperature, 150° F. The trouble with most platinum plating solutions is to keep the platinum in solution. With the above formula you will have no trouble.

Very little is known of rhodium plating. As the chemical properties of platinum and rhodium are very similar, we would suggest that you try the same procedure with rhodium as given above for platinum.

You should have no trouble plating a solid nickel knife with platinum to withstand a 15% sulphuric acid solution.

OLIVER J. SIZELOVE.

Blue Finish on Steel

Q.—We are producing small parts from half-hard cold-rolled strip steel. Would like to get your advice as to how to produce a cheap mottle or blued finish on same, preferably a dip that will accommodate about 100 pounds of parts at a time.

We now apply a finish by heat, which is slow, and uncertain as to color; also, the parts rust quickly. The last objection is the greatest.

A.—A blue finish can be produced on cold rolled strip steel articles by immersing in molten sodium nitrate, commonly termed saltpetre.

Procure an iron gas-fired furnace and fill pot, with sodium nitrate. Heat to 600° F. Place work in iron baskets and immerse in the molten nitrate. An immersion of 2 or 3 minutes gives a blue color. When the color is obtained, the work is plunged into water to cool and is then dried.

The work should be prepared for bluing by wet tumbling with burnishing bolts or freed from grease and tumbled with sawdust. Work must be thoroughly dry before placing in the molten nitrate, otherwise an explosion is liable to take place. A uniform temperature must be kept and work should be finally tumbled in sawdust moistened with paraffin oil, to prevent rusting.

OLIVER J. SIZELOVE.

Correction

On page 300 of the July issue of THE METAL INDUSTRY, it was stated that Dr. A. K. Graham, who delivered a paper at the Annual Convention of the American Electroplaters' Society, was a chemical engineer for the Roessler and Hasslacher Chemical Company. This should have read: Hanson-Van Winkle-Munning Company, Matawan, N. J.

When Spoons Are Made at Home

Pewter Spoons Now Being Made in the Old-Fashioned Way

By A. F. SAUNDERS
Designer, Benedict Manufacturing Company

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

In this age of factory made products, we have become so dependent upon the machine to supply our needs that we are prone to forget that once upon a time many of the things used by our ancestors, especially those living in the rural districts, were of home manufacture. Not the least important of these home-made articles were the pewter spoons in general use on the tables of all but the wealthiest families in Colonial times. Those were the days when the simple family fare consisted chiefly of soups, stews, hashes and boiled porridge; such foods as had to be eaten with spoons when there were no forks.

The present day vogue for pewter ware has created a keen interest in everything made from this old time metal, so the discovery last Summer of a family living in a little Canadian village still making their pewter spoons in the old fashioned way, prompted the writing of this tale of a simple homely art that harks back to the home life of early America.

Up in the Province of Quebec, a few miles north of the boundary line dividing the old State of Maine from Canada, lies the quaint village of St. Joseph. Here in a little plastered cottage, overlooking a quiet reach of the Chaudiere River, a stream made famous by Sir Gilbert Parker's romantic story, "The Right of Way," lives Theodore Gilbert, whose family numbers among the oldest settlers of this backwoods town. Mr. Gilbert is the proud possessor of a spoon mold, which he claims has been in active service in his family for two hundred years.

FIG. 1—MR. THEODORE GILBERT, THE SPOONMAKER

This old mold is still used to supply the pewter spoons in his own household and also some of his thrifty neighbors, who bring him their pewter spoons when they show signs of wear, to be re-cast into new spoons. Visiting tourists too, have heard of Mr. Gilbert's spoon making and he now sees a growing market for his home-made pewter spoons as souvenirs of the little Canadian village of St. Joseph.

Mr. Gilbert's domestic spoon making is an interesting survival of a period in the home life of America, when there was hardly a village where at least one family owned a spoon mold and which they, of course, were always willing to lend their less fortunate neighbors when new spoons were needed.

It has been told of one town down in Maine that at one time in its history, all of its pewter spoons bore the letter "L" on their handles, the initial of the only family possessing a spoon mold, and the thrifty housewives for miles around carefully saved all their worn out pewter plates and dishes to be melted and cast into spoons when the mold could be borrowed from the neighbor.

The making of pewter spoons was a simple casting process. The molds were made of iron or brass, though some of the earlier molds of pioneer days were made of wood, when metal was scarce. The two sections of the mold are held in place, during the process of casting, by means of a pair of iron tongs, the molten metal being poured into the mold with a small ladle. When completely full the mold is opened and the spoon removed. When the required number of spoons are cast, the projecting end of metal left by the pouring channel or gateway, is clipped off and the spoons are ready for use.

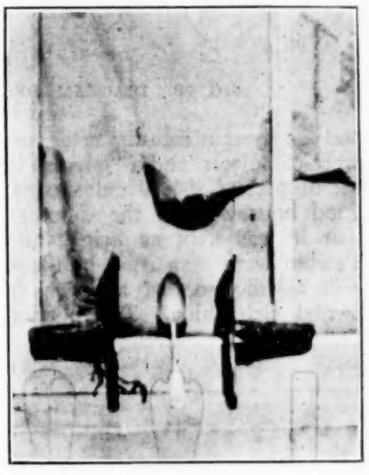


FIG. 2—MR. GILBERT'S TWO HUNDRED YEAR OLD SPOON MOLD AND PEWTER SPOON

In Colonial times the traveling tinker was often called upon to make spoons as well as to repair the kitchen pots and kettles. He was a very handy fellow who could fix most anything in metal. Often the tinker owned a set of spoon molds and usually he supplied the necessary metal for making the spoons, which perhaps accounts for the difference in quality of the metal found in old Colonial spoons of pewter.

In design, pewter spoons invariably followed the particular patterns of the silver spoons of the period. In size, most of these old spoons were about the same as our present day dessert spoons, although many tea spoons and large serving spoons were also made of pewter.

The design of the spoon from which Mr. Gilbert's mold was made is the plain flat-stemmed, pointed bowl with

rat-tail back of the time of George I, 1714-1727. This pattern was called the old English shape, and with slight variations was the fashion in spoons, both in England and America during the 18th Century.

The use of pewter for household utensils in England dates back to the 13th Century and according to official documents of the time of Edward I (1271-1307), the royal pantry contained besides the "leaden" cooking vessels, a supply of over three hundred pewter plates, dishes, cups, salts and platters. At the time America was settled,

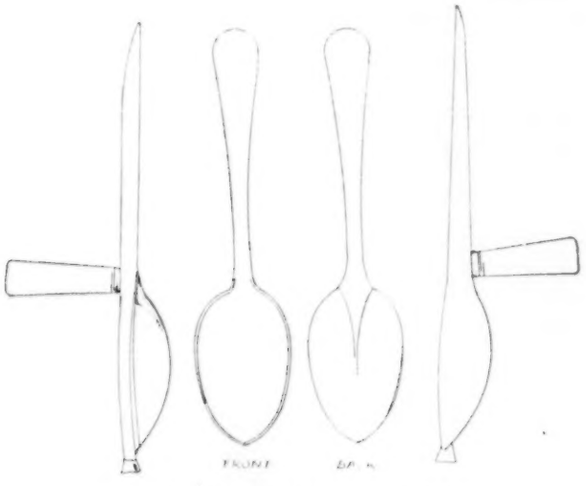


FIG. 2B. DIAGRAM OF SPOON MOLD.

and for over a century after, most of the eating utensils were of pewter, and a "garnish" of pewter, meaning a full set of plates, dishes and spoons, was the pride of every good housewife of the Colonies. We can rest assured that it was kept as bright and shining as any silver. Pewter ware was used in the wealthiest of families, as well as the poorest and was preferred by many who owned rich china. The patriot, John Hancock, was a

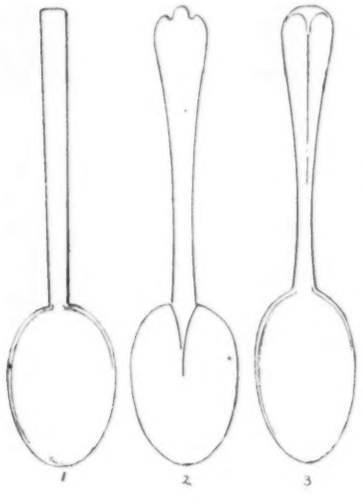


FIG. 3—THREE PEWTER SPOONS OF COLONIAL DAYS. NO. 1. "PURITAN" OR STUMP STEM, 1650—NO. 2. "TRIFID" OR NOTCHED END, 1860—NO. 3. "RIDGE STEM" 1700.

great lover of pewter ware and was known to dislike the sharp clatter of the porcelain plates.

The word "Pewter" has its equivalents in many languages, French "peutre" dates back to 1229; the Dutch called it "speawater" or "peawater," while the English at first spelled the word "peuter." As far back as the 14th Century the making of pewter ware had become such an important craft that regulations were drawn up by "the Worshipful Company of Pewterers" of London to regulate the quality of the metal and it became unlawful to sell pewter ware in the city unless it had first been assayed by the wardens of the company.

The earliest pewter of best quality consisted of tin with as much brass as the tin could take up, the proportion being about four parts tin to one of brass. A less fine quality used for candlesticks, mugs, pots and bowls, was composed of a mixture of tin and lead in the same proportions of four to one. This inferior metal was commonly called "black metal" because it tarnished easily.

The best quality of pewter, called plate pewter, used in the making of the highest grade of table furnishings including spoons was of the following proportions: tin 100 parts, antimony 8 parts, copper 4 parts.

The simplest way to test pewter is to draw the piece across a sheet of white paper. If it contains more than ten per cent of lead, it will leave a dark mark. The greater the amount of lead the darker the mark will be. This is, of course, but a rough test as the only sure way of determining the exact composition is by means of chemical analysis.

Perhaps a word about the cleaning of pewter ware will not be amiss. If a bright finish is desired, soak the article several hours in hot water, to which has been added from three to four ounces of caustic potash for each gallon of water. When the pewter is removed from this solution, dry with a soft flannel cloth, then rub over the surface carefully with a cork dipped in olive oil and a little flour pumice, polish up with a chamois skin and whitening.

Electro-Pickling Steel

Q.—In the recent edition of your PLATERS' WRINKLES, on pages 25 and 26, it is stated that iron and steel may be electrically pickled in a hot solution of crude sodium bisulphate, and that the scale and rust are almost instantly removed.

Can you tell us how we can secure more detailed information in this regard? Perhaps you can give us the method?

A.—Crude sodium bisulphate is more commonly known as nitre cake. It is a by-product of the manufacture of nitric acid.

Electro-pickling is accomplished under the same electrical condtions as electroplating; that is, the articles of steel are made the cathodes, while the tank lining is used as the anode.

The tank should be made of cypress; it should be lead-lined, with the seams burned in. Lead steam coils must be used for heating the solution.

At least 6 volts of electricity at 20 amperes per square foot of work surface area should be employed in electro-pickling.

The minimum amount of sodium bisulphate (nitre cake) per gallon of water should be 8 ozs. This may be increased to 24 ozs. or whatever strength in between is found necessary for efficient results. The temperature should range from 80 to 160° Fahrenheit.

The iron scale that is reduced goes into the solution as ferrous sulphate of iron. When the solution becomes dense, it is advisable to let it cool down to normal temperature and then to draw off 40 to 50% of it from the bottom. Then the solution can be renewed with fresh nitre cake and water. For this purpose, a valve arrangement in the bottom of the tank is necessary.

Nitre cake solution is an excellent one for pickling small steel articles by the oblique tumbling barrel method. Nitre cake can be purchased from firms manufacturing sulphuric and nitric acids. CHARLES H. PROCTOR.

THE METAL INDUSTRY

With Which Are Incorporated

THE ALUMINUM WORLD, COPPER and BRASS, THE BRASS FOUNDER and FINISHER
THE ELECTRO-PLATERS' REVIEW

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Edition this Month, 6,000 Copies. Buyer's Guide—Advertising Page 83.

Editorial

A New Metal Institute

The metal trades have given additional evidence of their desire and ability to keep up with the times by their formation of the Non-Ferrous Ingot Metal Institute. This institute has been in the process of organization for a number of months but was definitely launched at Atlantic City on July 20. At this meeting a constitution and by-laws were ratified and officers elected. (See page 368 of this issue of a complete report.)

According to Benjamin Harris, the first president, the purpose of the Institute will be to study the needs of the metal consuming public. Surveys will be made of the problems of the manufacturers and consumers of ingot metal in order to determine the most important fields for further activities. Later, technical researches will be made covering the problems of the manufacturer and user of ingot metals, and also commercial researches: the encouragement of high standards of products and business practice.

This is a far cry from the old scrap metal business and for that matter the old ideal of competition without restraint. It seems that a new policy is forming in the business and manufacturing world. Competition, of late years, instead of being the life of trade has been the death of profits. To remove competition entirely would be neither desirable nor possible, but unintelligent and unrestrained competition can be fully as harmful as unrestrained monopoly.

The correct procedure is intelligent competition, and open and above-board co-operation. This does not mean price-fixing or private agreements to keep prices at an abnormal level. Co-operation in developing standard methods of cost keeping; co-operation in developing high standards of products; co-operation in eliminating the trickster and unfair competitor will go a long way toward stabilizing and educating those engaged in an industry to conduct their business intelligently. In that way the level of the producer will be raised and the best interests of the consumer will be protected.

We wish the best of fortune to the new Non-Ferrous Ingot Metal Institute. It should be an important factor in the production and manufacture of ingot metals.

American and Foreign Plating Methods

We have heard for so many years that the United States is the land of speed and quantity production, that we have almost come to the point of shrugging our shoulders at the idea of doing work in any other fashion. We have almost eliminated from our minds the inevitable disadvantages which accrue to this system of operation. We point with pride to the tremendous flow of raw metals out of our smelting and refining plants; to the billions of pounds of manufactured products rolling through our mills and shops; and to the unquestioned wonder of this age of production—the automobile shining like a new pin and being produced in very much the same fashion—all by automatic manufacturing and material handling equipment.

An illuminating side light on the effect of work of this kind was given by E. G. Lovering in his article on "Nickel Plating Practice In Cuba" (published in our June issue, page 260). The following conversation tells the story in a nut-shell.

> "I told him (the nickel plater in Cuba) that in the states they were using higher current densities and would do the job in half the time that he took, and he replied in Spanish, "'Well, maybe that is why we get so many parts to do over.'"

The old world method of overcoming trouble was to take extra care and spend more time. The American method is to look for new automatic ways and means. In the old days quality came first and speed, last. Nowadays speed comes first and quality, a close second—but speed must come first.

One could moralize on this situation indefinitely without benefit to anyone—even the moralizers. "We are faced with a condition, not a theory," and we cannot change it by wishing. The large markets of the world want their products at the lowest possible prices and we must have the large markets in order to keep our plants and our people busy. There is no other way of supplying them, that we can see at this time, except by quantity production, so we might just as well start from that premise as it seems to be unchangeable.

What is the answer? Not slower, but more careful methods and better materials. Does the nickel plating rust? Then let us use a coating of copper or cadmium under it. We may even use three or four alternating coatings. And there is also chromium; perhaps this will solve our problem.

The encouraging feature of the whole situation is the fact that quality is not being forgotten. To be sure large masses of work are turned out very cheaply and of very low grade, but there is always the unremitted pressure of the buyer for something better at the same price. Instead of asking only for the cheapest, the public now wants the cheapest and the best. Impossible? Per-

haps. But the ideal is praiseworthy. It results in the distribution of better products to the people at large, and not simply the reservation of the good things of life for the fortunate few.

This means hard work, technical and financial difficulties to overcome and intense effort for all concerned. It means that eventually, all those engaged in industry must perform a useful purpose and do their work well. There is no room for parasites. The trustworthy, capable and energetic will rise and receive the recognition which they deserve while the unfit will drop out.

Good Management

In boom times everybody makes money and everyone is "successful." In 1918 and 1919 a business failure pointed either to dishonesty or to hopeless incapability. Profits were enormous; dividends were likewise.

In these days it takes more than ordinary ability to achieve success. An organization, to be very prosperous, must have weathered the storms of 1921 and 1922 and the choppy seas of recent years.

How was this done? We lay down no generalities but simply point to two conspicuous examples, the American Telephone and Telegraph Company and the Baldwin Locomotive Works. The American Telephone and Telegraph Company achieved its present impregnable position by plowing in its profits, spending an extraordinary percentage of its earnings on new plant and equipment, and developing new business. Instead of disbursing its profits in the form of dividends the company put them into more lines and improved service.

This was easy, one might say. The telephone had and still has unlimited prospects ahead of it. It was obviously the line of least resistance.

Well then, let us point to the Baldwin Locomotive Works. In 1927, according to newspaper reports, their plants operated at about 10% capacity. A condition like this should have thrown them into the hands of receivers in a very short time. But strangely enough, the Baldwin Locomotive Works have never passed a dividend in recent years and have continued to be the largest factor in their industry. Why? Because in boom times they conserved their resources and reserved a large part of their profits for future emergencies, foreseeing the hard times that might come. They lived on the fat which they had built up and there was enough of it to see them through any famine.

These are not the only well managed companies. Hundreds of large ones could be added to the list and undoubtedly thousands of smaller organizations. The owner of the small foundry may be managing his affairs just as capably as the president of the Standard Oil Company. The question is not one of size, but of intelligence. Those who are careful and not over-enthusiastic in good times will have a back-log to rest against in bad times. It is much easier to remain undiscouraged and to keep a stiff upper lip in the face of adversity when one has a surplus to fall back upon.

Solutions Analyzed for Shop Problems

We wish to bring to the attention of our readers the fact that we have entered into an arrangement whereby our Shop Problem Department will be considerably strengthened. We are now in a position to have samples of solutions analyzed. We ask therefore that those who write to us, having difficulty with their solutions, send us without fail, a 2 or 3 ounce sample of the solution which gives trouble, so that we can have an analysis made and then make definite recommendations.

We ask also that enquirers use the following suggestions as a guide when consulting us about their troubles.

1. State your problem in full.
2. Send us if possible, a sample of the product which you wish to make.
3. Send a sample of the unsatisfactory work.
4. Send a 2 or 3 ounce sample of the plating solution which is giving trouble.
5. Make your questions as specific as possible. General questions can be answered just as well by text books and at greater length.

If these rules are followed, we shall be able to answer questions accurately and in full detail.

The Shop Problem Department has long been the pride of THE METAL INDUSTRY. Through it we have aided thousands of subscribers. To the large manufacturer it has meant the elimination of great losses. To the working plater it has sometimes meant saving his job. Under the guidance of our experts, specialists in their particular fields, this department has grown to such proportions that only a small fraction of the questions which we receive can be published. There is no room for all of them, but we communicate with every enquirer by mail, giving him our best assistance. During the three years, 1925-1927, we answered 1535 questions.

We feel that this work is an important adjunct to our business of publishing the best and latest shop practice, and we want our subscribers to take full advantage of it. At no time however, should it be considered a replacement for the skilled plater, chemist, or foundryman. But it is, we believe, an important and in many cases invaluable helping hand in an emergency.

The opinion of our readers about the value of our shop problem department can be judged from the leading article in this issue on page 339, by Otto Gerline, who writes in a humorous vein but, as he himself states, from the bottom of his heart. Mr. Gerline says:

"All we ask of you writers is to be mind readers and tell us what we want to know. Even though you may spend an hour or more looking up references; even though you may have spent 35 to 40 years at the business to learn these things, all we ask of you is the answer to our problems. And we will not tolerate any mistakes.

"In all sincerity I would like to state right here that the writings of such men as yourself (William J. Reardon) . . . deserve an awful lot of credit and the thanks of all the brass foundrymen in the country, especially us little fellows who have not the capital or facilities to go into research work."

That is the purpose our shop problem department; to help, with an idea or a definite recommendation, those who have not the facilities for extensive research.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

ASSOCIATE EDITORS { JESSE L. JONES, Metallurgical; WILLIAM J. PETTIS, Rolling Mill; W. J. REARDON, Foundry; P. W. BLAIR, Mechanical; CHARLES H. PROCTOR, Plating Chemical

Depositing Silver on Glass

Q.—Please tell me how to silver plate on glass to be used for name plates. I want to get a bright polish on pieces of glass ten inches square and one inch thick. Must have an adhesive surface that can be engraved. I have a yellow gold solution that I use for regular plating but I know nothing about plating on glass. Please state full directions.

A.—The following is the most satisfactory method for producing an adherent deposit on glass:

Use a paper stencil, preferably one made of waxed paper, to cover the glass. Cut the desired design in the waxed paper and secure the paper to the glass, leaving the cut-out to expose the surface of the glass. Coat the exposed surface of the glass with air-drying asphaltum varnish. When varnish is partly dry but still tacky, apply the finest copper-bronze powder procurable. When covered with the powder, brush in well with soft brush. When varnish and powder are thoroughly dry and hard the surface is ready for plating.

Make contact with the copper-bronze surface by using soft copper wire. Prepare a copper sulphate solution as follows:

Water	1 gallon
Copper sulphate	1¾ lbs.
Sulphuric acid	4 to 8 ozs.
Yellow dextrine	⅛ oz.

Use 1 to 2 volts; 5 to 10 amperes per square foot of work surface area. Copper plate until you have a sufficient thickness of copper to take a silver plate, then you can silver plate the copper surface to any thickness you desire, using a regular silver solution. It is well to apply a thin coating of mercury to the copper deposit by using a mercury cyanide solution before silver plating. This will make the silver more adherent.

This is probably the best method for such work unless you use the silver depositing method which is employed in silver plating glass table ware, etc. This method consists of applying very finely powdered metallic silver mixed with Dresden thick oil and Venice turpentine, as a paint. The glass is then heated in a gas fired furnace to a point near the melting temperature of the glass. The oils become volatilized and the silver becomes fluid and is burnt into the glass. Silver can then be plated on the silvered surface to any thickness.—C. H. P., Problem 3,771.

Gilding Table Ware

Q.—I need a method of gilding a cheap grade of table ware. I want a solution that can be operated easily and quickly and which will be a bright gold, 24-carat color, but cheap enough for five-and-ten articles. I am enclosing remittance for a copy of PLATERS' WRINKLES.

A.—For your purpose we would suggest a salt water gold solution, full details of which will be found on Page 17 of PLATERS' WRINKLES, which we have sent you. If the articles to be gilded are made of brass, you can use an acid dip or a polishing operation first, then immersion in the second of the Dip Gilding Solutions given in PLATERS' WRINKLES. The method of doing this is given there. You can choose either method; both give excellent results. The Fulminate of Gold can also be used.

The sodium ferrocyanide should be dissolved in one pint of boiling water, to which you then add the gold salt. Boil this for a short time, then add to the water to make up a gallon or as much, in proportion, as desired.

The yellow prussiate of potash or soda are identical materials, so that for the salt water gold solution they should be used according to directions above. The gold will have to be replenished as it is used up by additions of yellow prussiate of soda and gold only. —C. H. P., Problem 3,772.

Plating Bicycle Spokes

Q.—We have to nickel-plate about 150,000 cycle spokes per day (surface 265 square meters) as rustproof as possible. Formerly we used to get spokes made of hot-galvanized wire, we highly polished, brass-plated and nickel-plated them. The result was fairly good but far from a 100% rustproof, while it required very careful handling.

We found out that if we did away with the galvanizing and merely brass-plated and nickel-plated, the result was hardly any the worse and much cheaper. Two hour brass-plating and 1½ hour nickel; the thickness of each coating being about .003 mm. We are not satisfied though. Rusting still occurred soon after. We found if we brass-plated thin, say, 20 minutes, and copper-plated in an acid bath, we could get in half an hour as much as .01 mm. copper on; a very thick coat for barrel-plating. We nickel-plated for half an hour and the corrosion tests were highly satisfactory.

This was done in a trial bath. Now, before changing all our baths we would like to know what you think of this. We want your sanction before carrying on. Will this copper-plating in an acid bath be all right in the long run? Why is it never done? Are we right if we assume that copper-plating in an acid solution goes much quicker, while the deposit, being free from hydrogen, is better?

In a recent problem in THE METAL INDUSTRY, it says that auto radiators are coppered in cyanide solution. Why? Would not plating in acid solution, once they have been flashed, give them three times the coating in the same time and make them much more rustproof? Beside that, would they not be better prepared for chromium-plating afterwards?

If plating spokes in an acid copper solution is all right, would you please give us the best solution? We can heat the baths to any temperature.

A.—Early in the production of bicycles in America, about 1880, The Pope Manufacturing Company, Hartford, Conn., who manufactured the Columbia bicycle, used a method almost identical to that which you have outlined, except that the nickel was first deposited upon the steel spokes as well as on handle bars, forks and other parts. After nickel plating, the parts were then copper plated in an acid copper bath to any desired thickness. After copper plating, the surface was polished to a lustre and then nickel plated and polished. The method has been used in the coal and gas range industry since 1881 and is used in the automobile industry when the maximum resistance to rust is required. At present this method is used in the largest automobile manufacturing plants in America. We can therefore state that you can be safe and assured of good results by using this method in your plant, which I understand to be in Holland. The best acid copper solution is prepared as follows:

Water	1 gallon
Copper sulphate	1¾ lbs.
Sulphuric acid, 66°	4 ozs.
Yellow dextrine	⅛ to ¼ oz.

If heat is used in the acid copper bath, air agitation of the solution is advisable in order to produce a smooth copper deposit.

The reason that cyanide copper solutions are used is that they have greater throwing power than acid copper solutions. When they are operated at 140° F. they deposit as fast as an acid solution.

It might interest you to know that bicycle spokes are now being plated in America with cadmium. This metal protects steel from atmospheric corrosion and is much more satisfactory for the same thickness of deposit than any other metal used as a deposit on steel for finish and protection from rust. Try the following solution on some of your products then expose them to the atmosphere. You will find they will not rust:

CADMIUM SOLUTION

Water	1 gallon
Sodium cyanide, 96-98%	9 ozs.
Cadmium oxide	2 ozs.
Caustic potash	1 oz.
Black cane sugar molasses	¼ oz.

Anodes, cadmium; voltage, 4 to 5; temperature, 80 to 120° F.; amperage, as found desirable.—C. H. P., Problem 3,773.

Spotting on Copper

Q.—We copper plate and lacquer guards for electric heaters. These guards are made of copperized wire which we plate, bright dip and lacquer. We use a copper cyanide solution and have been having considerable trouble with the cyanide spotting out after the guard has been bright dipped and lacquered. We have tried giving them a coating of nickel, which helps to some extent but have had trouble with that also. We used a weak solution of acetic acid in the hot rinse water, but that is not a production remedy.

Could you tell us some way to neutralize the cyanide so that it will not spot through the lacquer?

A.—Spotting out of plated metal products still continues to be a very serious and costly problem to the plating industry, and it has not been permanently solved as yet. The Bureau of Standards, Washington, D. C., in collaboration with the American Electroplaters' Society has been studying the problem for the past year and will continue to do so for at least another year, in an effort to find some means of obviating this trouble. You seem to have tried a method about as good as any we can suggest.

If possible, you should maintain a separate hot water tank for the acetic acid addition as a neutralizer for the cyanide in the pores of the metal. When the guards come from the solution, you should then be able to maintain your normal production ratio. The procedure should be as follows:

Cleanse the plate, then thoroughly wash in cold water. Immerse in special hot water acetic acid dip. Do not run water into the tank constantly but just as required to maintain the original water line. The acetic acid content should be constant; however, to maintain this it will be necessary to make additions of acetic acid at intervals. The articles should be left in this solution for a moment or two.

After the acid treatment, rinse direct in the boiling water and lacquer as usual.

The only other remedy we could suggest would be to immerse the guards in a heated lacquer thinner after the final boiling water rinsing, then lacquer. The cheapest solvent for this purpose would be ethyl acetate. This costs about one-third as much as a regular lacquer thinner. If you can carry out these suggestions, your spotting out problem should be eliminated.—C. H. P. Problem 3,774.

Stripping Plating Baskets

Q.—We use a number of brass wire plating baskets for nickel plating small steel parts. The coating applied is quite a heavy one and within a comparativcly short time the baskets become encrusted with a heavy deposit which prevents rapid action. We have a stripping solution for nickel plated work but find that this affects the light brass wire and we are unable to satisfactorily strip the nickel from the baskets. Can you recommend a solution which will be suitable for removing nickel from plating baskets and at the same time will not affect the brass wire to any considerable extent?

A.—To eliminate a good deal of your trouble and waste of nickel, why not make up the frame of your baskets with strips of hard wood? Maple wood is preferable! The strips need not be more than ⅜ inches thick and the width equal to the depth of your present brass wire plating baskets. Cover the bottom of the wooden frame with the regular brass wire cloth you now use. Make the contacts from the bottom of the basket, then secure the heavy wire used to carry the negative current to the ends of the baskets with staples ending up with the formation of either one or two hooks to support the basket in the nickel solution during the plating operations.

The baskets should be used for plating only. Cleanse the product in the old baskets first, before placing in the wooden frame baskets. Otherwise the wood would become impregnated with the cleansing solutions and be detrimental to the nickel solutions.

You can strip the nickel from the baskets by the aid of an electro strip, the basket being used as the anode:

Sulphuric acid 66°	1 gallon
Water	1 pint
Glycerine	1 ounce

For cathode use sheet lead or copper, which should entirely surround the baskets or articles to be stripped. A voltage of 4 to 6 gives good results. Strip the baskets quite frequently to avoid an excess of nickel upon them, then the brass wire will last much longer—C. H. P., Problem 3,775.

Zinc Cyanide Solution

Q.—We are manufacturers of locks made of brass and steel stampings. All of the steel stampings are electro galvanized. Our equipment consists of one 450 gal. still tank and two barrel plating machines. We tried for some two years an acid solution in the barrel plating machines. Results were anything but dependable. About a year ago we tried a cyanide solution, using carbon tetrachloride, cyanide and mercury dissolved in nitric acid, with possibly some sodium. This solution has at times given excellent results, but we have never had it so we knew definitely what to expect in any lot of work galvanized.

We are not absolutely set on using the cyanide solution for galvanizing, but since it will cost quite a bit to change we prefer to continue using it, if possible. We wish to get the correct formula and some definite schedule for replenishment of the chemicals required to keep it right. We will appreciate your giving us a correct formula for cyanide galvanizing solution, describing the ingredients and the sequence and manner of mixing same in plain English so that our foreman will have no difficulty or uncertainty as to the correct procedure. Our foreman is not a chemist.

A.—Zinc cyanide solutions give best results and can be used in regular still or mechanical barrel plating, due to the greater throwing power of this solution as compared with an acid zinc sulphate solution. The very best types of solution for your purpose if your product is made of steel are the following:

MECHANICAL BARREL SOLUTION

Water	1 gallon
Sodium cyanide	6 ozs.
Zinc cyanide	6 ozs.
Caustic potash	4 ozs.
Powdered glue	1 oz.

STILL SOLUTION

Water	1 gallon
Sodium cyanide, 96-98%	4 ozs.
Zinc cyanide	4 ozs.
Caustic potash	3 ozs.
Powdered glue	1 oz.

Anodes are pure zinc for 70% of anode surface; 30% steel.

We note that you use mercury in your present solution. Certain solutions containing mercury are patented. If you have not done so, you should avoid infringement by investigating and, if necessary, conferring with owners of such patents.

To prepare either solution, put one-third of the total amount of water to be used in the tanks and heat to 140 to 160 degrees Fahrenheit. Then add the total amount of cyanide; then the zinc cyanide; then the balance of the water; then the caustic potash; then, finally, the glue, which should be dissolved in some boiling water before adding to the solution. Stir thoroughly. Solution is then ready for use with anodes of zinc and steel in the proportions given. The proportions of zinc to steel are measured by computing the anode surface areas.

When mercury is used, the glue is not necessary. However, a little molasses may be used in such a solution.

The only addition required to maintain the solution is sodium cyanide, 96-98%. A minimum of ⅛ oz. per gallon of solution per day is added to the still solution; to the barrel solution add a minimum of ¼ oz. per gallon per day.

Use 5 to 6 volts of current for the still solution; 8 to 10 volts for the barrel solution.

This data should give you the desired results. To keep the zinc plated products from staining, you might add ⅛ oz. of sulphuric acid per gallon of boiling water when drying out the articles.—C. H. P., Problem 3,776.

Patents

A REVIEW OF CURRENT PATENTS OF INTEREST

1,668,307. May 1, 1928. **Alloy and Material Employing the Same.** Joseph G. Donaldson and Henry L. Coles, Hamilton, Ohio, assignors to Guardian Metals Company, Hamilton, Ohio. A compound plate consisting of a core which is an alloy of 99.385–99.230% copper, .015–.020% carbon and .60–.75% silicon, said core being encompassed by other metal and united thereto as by alloying therewith.

1,668,642. May 8, 1928. Manufacture of Alloys. William M. Grosvenor and Victor P. Gershon, New York, N. Y.; said Gershon assignor to said Grosvenor. A substantially uniform and homogeneous alloy containing about 80% of nickel and about 20% of zinc, having a melting point above the boiling point of zinc and having the characteristic that when alloyed with 3 times its weight of fine gold the resultant gold alloy not only exhibits a whiteness substantially like that of platinum but it also is capable of being cast or rolled for making jewelry.

1,669,224. May 8, 1928. **Bias Buffer.** Frank L. Yerges, Fremont, Ohio; Amelia N. Yerges, executrix of said Frank L. Yerges, deceased, assignor to The Yerges Manufacturing Company, Fremont, Ohio. A buffing wheel ply made from a blank, the marginal edges of which blank are bias cut in respect to the weave, said blank being folded into parallel pleats so that the resultant form of ply is substantially circular.

1,669,387. May 8, 1928. **Composition for Removing Nitrocellulose Lacquers.** Edwin F. Cathcart, Lakewood, Ohio. A nitro-cellulose lacquer remover proportioned and compounded substantially as follows: Four and one-half pounds of paraffin melted in twenty-five gallons of benzol and seventy-five gallons of acetone stirred into the paraffin-benzol until the composition of all three becomes cold.

1,669,485. May 15, 1928. **Metal-Reclaiming Process.** William G. Nordling, Newark, and Alexander Stewart, Jr., Roselle, N. J. The metal reclaiming process, which comprises a preliminary separation thereof by subjecting a metallic mixture to a temperature sufficient to melt one of the constituents but not the residue, agitating the mixture to remove the molten constituent from the residue, withdrawing said molten portion, then immersing the residue in a bath of molten material to melt out further quantities of the constituent originally treated for removal.

1,669,580. May 15, 1928. **Process for Extracting Tin Mixture From Lead and Tin Alloys.** Max Speichert, Berlin-Tempelhof, Germany. A process for extracting, from lead and tin alloys containing antimony and copper and which may contain small amounts of other metals, an alloy known as "tin mixture" and being a eutectic mixture containing from 54.5 to 55% of tin, not more than 3.6% of antimony, not more than 0.2% of copper, the remainder being lead, said process consisting in melting immediately as a whole, without any previous treatment such as liquidation.

1,669,975. May 15, 1928. **Metal-Coating Machine.** Arthur R. Curtis, Cleveland, Ohio, assignor to Clarence J. Hays, Cleveland, Ohio. A metal coating machine, a receptacle for fluid metal, a submerger by which the articles are lowered into the fluid metal, said submerger having independently movable, pushing members engageable with the articles and each capable of exerting a downward thrust on an article.

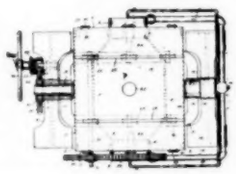
1,670,307. May 22, 1928. **Process for Separating Tin and Arsenic Compounds.** William T. Little, Westfield, N. J. The process of separating sodium stannate from sodium arsenate from a mixture including them which comprises leaching the mixture with a liquid sufficiently elevated in temperature to melt the sodium arsenate.

1,670,459. May 22, 1928. **Fluxing Compound.** Donald C. Lee, Spokane, Wash. A fluxing compound for a metal alloy comprising muriatic acid 1 gallon, zinc 3 pounds, blue vitriol (crystals) 12 ounces, resin 21 ounces.

1,670,956. May 22, 1928. **Aluminum Alloy Piston.** Ray E. Day, Seattle, Wash. A piston having a head separated from the skirt by a horizontal slot, and relieved areas about the piston pin openings, said relieved areas being separated from the slot by an unrelieved area which furnishes a bearing above the piston pin and prevents the entrance of oil into the space formed by the relieved area.

1,671,408. May 29, 1928. **Alloy.** Michael G. Corson, Jackson Heights, N. Y., assignor to Electro Metallurgical Company, a Corporation of West Virginia. A non-ferrous alloy containing about 15 per cent to 25 per cent of manganese and 0.1 per cent to 3 per cent of an element having the properties of phosphorus and silicon, with the balance principally copper.

1,671,546. May 29, 1928. **Aluminum-Melting Furnace.** Paul H. Romph, Detroit, Mich.



A furnace comprising a cylindrical metallic pot having coaxial pouring apertures at opposite ends thereof, said pot having smooth uninterrupted metallic inner surfaces adapted to directly contain the molten metal, an outer casing surrounding said pot forming a heating chamber, trunnions supporting said outer casing such that the axis of said pot is normally substantially horizontal, and means for tilting said pot to discharge the contents thereof through one of said pouring apertures.

1,671,952. May 29, 1928. **Metal Alloy.** Lewis R. Brink, Chicago Ill., assignor to Barnhart Brothers & Spindler, Chicago, Ill. A metal alloy consisting of approximately 90 per cent aluminum, approximately 5 per cent copper and approximately 5 per cent nickel.

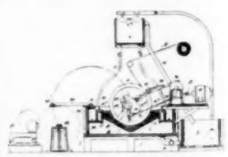
1,672,180. June 5, 1928. **Treatment of Metal Surfaces.** Walter Smith, West Hartlepool, England, assignor to The Expanded Metal Company, Limited, London, England.

A process for treating a metal surface so as to protect the basic metal from corrosion which consists in subjecting the metal surface at an elevated temperature firstly to the action of air and then to the action of carbon disulphide.

1,672,280. June 5, 1928. **Protective Covering for Aluminum Bodies and Process of Making Same.** Walter C. Peterson, Detroit, Mich., assignor to Packard Motor Car Company, Detroit, Mich.

A method of making a liquid covering for aluminum bodies which consists of heating phenol and formaldehyde until the mixture reaches substantially the consistency of molasses and is about one-half of its original volume, and then adding an aluminum silicate of approximately 10 per cent by weight of the final mixture.

1,672,402. June 5, 1928. **Plating Apparatus and Product Thereof.** Edward R. Armstrong, Hollyoak, Del., assignor to E. I. du Pont de Nemours & Company, Wilmington, Del.



In a plating device, an electrode presenting a plating surface and an upstanding longitudinally extending edge-guarding projection of non-plateable material, said projection comprising a plurality of abutting sections, and means fitted liquid tight between said sections thereby to prevent travel of the plating solution along the line of abutment.

1,672,444. June 5, 1928. **Producing Corrosion-Resistant Surfaces on Metals.** Frederick M. Becket, New York, N. Y., assignor to Electro-Metallurgical Company, a Corporation of West Virginia.

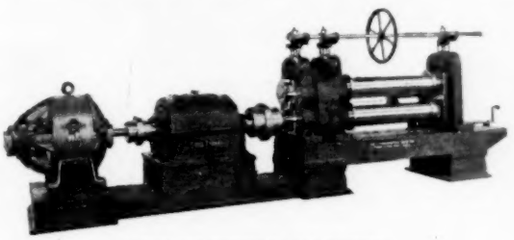
Process of forming on a ferrous article a corrosion-resisting integral case of predetermined composition containing chromium and silicon, which comprises applying to the article an excess of powdered ferrochrome-silicon having a higher chromium-silicon ratio than is to be present in the case, and thereafter maintaining the article in contact with the ferrochrome-silicon at a cementing temperature until the article is effectively cased.

Equipment

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

Slitting and Coiling Machines

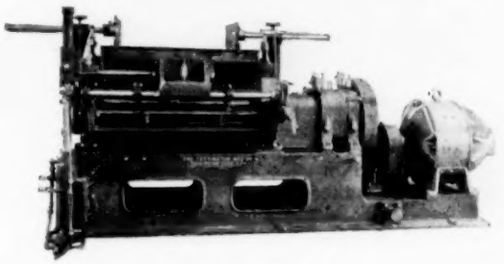
A new design of slitting and coiling equipment, said to be capable of performing heavy duty on wide metal, under exacting conditions, has been developed and placed on the market by The Torrington Manufacturing Company, Torrington, Conn. The equipment is in the form of two separate machines, one for slitting,



NEW SLITTING MACHINE

the other for coiling, and these may be used in combination or separately, as desired. The slitting machine has a capacity for metal up to 42 inches wide trimmed width, one-quarter inch thick. It is of the three housing type in which the outer housing is withdrawn to an extension of the bed pedestal in changing cutter blades and spacing collars. This machine is driven by a 50 horsepower motor, with herringbone type driving pinions and cutting arbor, which are enclosed in oil and grease tight cases, respectively. Flexible couplings connect motor to drive pinions and drive pinions to cutting arbor pinions.

The coiler is the usual three roll type with feed rolls. It is stated to be of heaviest construction and of capacity equal to the slitting machine. To handle the heaviest coils an air operated



COILING MACHINE SHOWING EXIT SIDE AND EJECTOR MECHANISM

coil ejector is provided for removing coils from the machine. Drive of coiler is by 25 horsepower motor through pinions enclosed in oil tight case and thence by spindles and couplings to feed and coiling rolls.

The equipment was designed and built to meet the requirements of one of the company's customers.

Metal Reclaiming Mill

The Standard Equipment Company, Inc., New Haven, Conn., manufactures a metal reclaiming mill, known as the No. 5 Standard, which has been made the subject of an efficiency survey by the A. C. Nielsen Company, engineers. The equipment was studied at the plant of the Smeeth-Harwood Company, Chicago, Ill., manufacturer of copper tuyeres and other parts for blast furnaces, which works over about 3,600 pounds of scrap and waste metal per week. The result of the survey was that a No. 5 Standard mill installed in this plant succeeded in making a saving of $2,200 per year over the former practice.

The mill consists of a steel drum rotated at slow speed in a water pan, and enclosing two crusher rolls. Alongside are sumps. Plates on the inside periphery of the drum form pockets which lift material shoveled into the drum to a point above the rolls, between which the material is crushed and carried again through the cycle. The lighter particles of dirt, sand and slag tend to flush away to the first sump, leaving the metal within the drum. The water passes on to the second and third sumps, and finally back to the pan beneath the drum. Only about 100 gallons of water are required for a run.

The material fed to the drum ranges from sand to one-inch pieces of slag. This is all reduced by repeated passage through the rolls until all metal is free and separable by flotation.

Usual operation at the Smeeth-Harwood plant is stated to be as follows: The mill is started and 600 lb. of refuse shoveled into the drum. The mill then is run 30 minutes, a similar charge added, the mill run 30 minutes, another charge added and the mill run for 3 hours to insure maximum separation. The material remaining in the drum is 75% copper, with slag. This is dumped by tilting the feed hopper which functions as a discharge chute. The mill is in operation for about 5 hours.

Feeding 1,800 lb. of refuse a day, the output of concentrate is about 400 lb., of which 300 lb. is copper. The average requirement is two days' operation a week with a recovery of 600 lb. of copper, it is claimed.

Chromium Plate Applied to Aluminum

National Chromium Corporation, 200 Varick Street, New York City, has just announced that after considerable research and experiment in their laboratories and plant, chromium plate has been successfully applied to aluminum articles on a commercial scale. It is stated that practically all the difficulties attendant upon this class of work have been solved and that full-scale factory operation is now in progress.

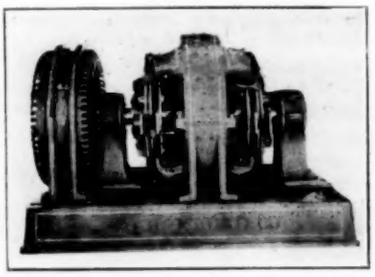
The aluminum, by a special process, receives a coating of nickel plate over which the chromium plating is applied. It is stated the chromium shows no tendency to blister and that it is firmly adherent, smooth, lustrous and gives complete resistance to weathering tests. The process is said to be applicable to practically all of the common aluminum alloys and the company's plant is plating a considerable variety of aluminum products at this time.

Solder Testing Scale

The Industrial Metal Company, 2900 East Cumberland Street, Philadelphia, Pa., reclaimers of nickel and tin bearing metals, metal specialties and industrial by-products, have on the market a balance by which, it claims, the tin content of solders can be instantly ascertained. In describing the apparatus, the company states that it is necessary to cast some of the solder to be tested in a mold which is supplied with the balance. The cast is placed on the pan of the scale and a weight is moved along the beam of the scale until a balance is reached. The weight indicates the tin percentage where the weight of the mold would be shown on an ordinary scale. There is also a scale of figures to show the percentage of antimony in material known to be made of lead and antimony. The construction of the scale is said to be substantial and accurate. It is made with agate bearings. The complete outfit consists of the balance, a mold and a 50 per cent brass weight. The company also supplies glass cases with drawers for these scales upon special order.

Motor-Generators for Chromium Plating

The Eager Electric Company of Watertown, New York, has placed on the market an improved form of motor-generator, especially designed to furnish power for electrolytic chromium plating of automobile bumpers, radiator shells, and other parts where such plating is desirable. It is also said to be suitable for general plating of that sort. The sets are built in several standard forms in ratings, ranging from 2,000 to 10,000 amperes, at 6 to 12 volts, in steps of 500 amperes on the generator side.



MOTOR-GENERATOR SET

Each set consists of a slow speed, separately excited synchronous motor, of voltages varying from 110 to 440 volts, according to the size of the motor-generator, driving a direct current electrolytic generator. The two machines are mounted on a common base, the frames of both being detachable for ease in installation. The rotors of both machines are mounted on a common shaft, which is provided with a two bearing support. The bearings proper are of the Timken tapered roller variety, there being two to each pedestal, mounted so as to allow for shaft expansion, and to take care of the over-hung load of the motor field.

Several new features have been adopted in the design and construction of the machines. The brush holders are made from steel punchings, plated with copper and cadmium to resist the corrosive agents usually found in the atmosphere of plating rooms. The brush holder supports are made of heavy sections, which are cast integrally with the generator field frame. As a result, the brush adjustment is very rigid, which helps to eliminate sparking and other commutation troubles caused by brushes bouncing on the commutator, it is stated. All the connections are made of heavy copper sections, fastened to the brush holder supports by insulated bolts. The terminals consist of heavy copper plates, designed to give a large area of contact for the cable connections.

The generator winding has been designed to give high efficiency, and efficiency is also aided by the frame construction, which allows for ventilation and plenty of surface for heat radiation. The armature is equipped with a double winding and two commutators in series, each furnishing half the rated output of the machine. This method of design is said to render the set more compact and to improve its performance by reducing the amount of current handled by individual brushes. The rate of brush wear is retarded and the life of the commutator segments increased. There is also less danger of arcovers owing to sparking at high currents, the company states.

Dry Process for Brass Finishing

A method whereby articles which are to be finished in brush brass or satin can be given such treatment dry, by quick cutting on an abrasive-coated wheel and then lacquering without intermediate lacquering has been developed by The Lea Manufacturing Company, Waterbury, Conn., manufacturers of greaseless compounds employed in metal finishing. The method is outlined by the company as follows:

The dry method, using a greaseless compound, is not new and has been found economical by numerous metal finishers. Its principle is simple, involving the application of a bar of composition having a binder of greaseless material to hold suitable abrasives to a cloth buffing wheel which revolves at moderate speed. A thin layer of the compound is applied to the wheel, there being enough moisture in the composition to produce such a film, which dries almost immediately upon application to the revolving wheel. This provides a flexible, dry cutting wheel. Suitable abrasives are prepared in this compound form for all kinds of metals and finishes. When buffing is finished, it is stated, the work is left dry and clean and is ready for lacquering.

Lea greaseless compounds are prepared in two-pound bars, which are packed in cartons of 25, 12, 6, 2 or 1 bar, as desired. The container is torn away as the bar is used, the open end being covered or immersed in water when not in use; this keeps the moisture content uniform. If it dries out, it can be restored by soaking in water until proper consistency is obtained. There are four standard grades: C for heavy cutting extra sharp abrasive; B for heavy cutting sharp abrasive; A for medium cutting; F for light cutting. There are also several special grades which are used for satin finishes, chromium plate, cutting oxidized finishes on metal novelties, removing filler and smoothing the surfaces of wooden articles before lacquering, painting, varnishing, etc.

Ball Anodes for Electroplating

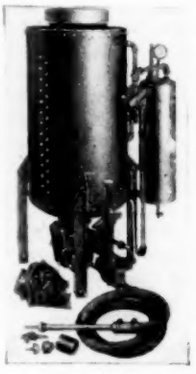
A new type of anode for use in cadmium plating has been developed by the Udylite Process Company, Detroit, Mich., which is available to all users of the Udylite Process. This anode is made in the shape of a sphere, and it is claimed that such anodes have a number of conveniences and advantages over the regular slab, cliptical or disc type anodes. The spherical anodes are used in a container which is made of wire mesh in the form of a cylinder which has a hook for suspension of the container in the solution. The containers are made in various lengths ranging from 18 to 36 inches, for tanks of various depths. The anode balls are placed in the container and new ones are added as the old ones are used up. It is claimed that the anode surface is thus kept constant, which is said to be an important factor in efficient operation. Other advantages claimed are that there are no studs to remove, no metal to pick out of the tank, and that the anodes are clean and accessible. Uniformity of deposit is said to be assured. A feature of the idea is that as the balls corrode and grow smaller, they work toward the bottom of the container, leaving room at the top for new balls of metal. Special length containers can be supplied, it is stated. The balls are made in 2 inch diameter, weighing approximately 1¼ pounds each. High purity metal is used for making the ball anodes. Stocks are kept at New York City, Matawan, N. J., Cleveland, Ohio, Chicago, Ill., and San Francisco, Cal.

BALL ANODES IN CONTAINER

New Portable Sand Blast Machine

In order to meet the demand for a small, portable sand blast equipment which can be operated with small air compressors supplying 8 to 16 cubic feet of air per minute, the Ruemelin Manufacturing Company, Minneapolis, Minn., has designed and placed on the market an equipment known as the "Junior Sand Blast Generator," which, it claims, fills the need for a small sized machine.

In describing its product, it is stated by the makers that the "Junior" is suitable for small shops requiring sand blasting equipment which is light and portable, for shops desiring auxiliary equipment to large machines, the small apparatus being suitable for fine line carving and other work where a needle-like stream of sand must be applied to produce certain results. It is suitable for use with carborundum as well as other sand blasting materials.



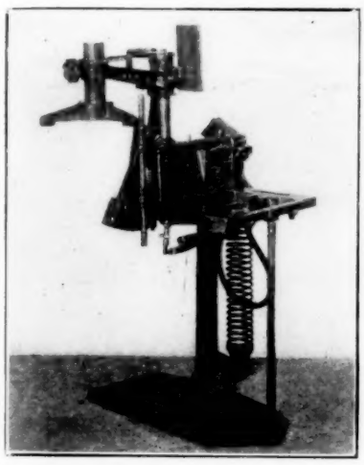
PORTABLE SAND BLAST OUTFIT

In this machine the company's automatic sand mixer box is incorporated. With this box, the sand does not have to be shut off when the machine is started or stopped. Entire control is centered in a triple air valve which is said to simplify and speed up operation.

The tank supplied with the machine has a capacity of 160 pounds of sand, which is said to be sufficient for an hour's blasting with a 1/8 nozzle, or 2 hours with a 3/32 nozzle. The machines operate on 8 to 16 cubic feet of air per minute, weigh 80 pounds and are furnished complete with nozzles and sand.

Hinged Roll-Over Core Machine

The Tabor Manufacturing Company, Philadelphia, Pa., has developed a new machine for making cores which, it claims, embodies a number of new and advantageous features, chief of which are the elimination of clamps and locking or unlocking of a leveling device, elimination of foot work; time and labor saving.



NEW CORE MACHINE

The machine is stated to be simple in construction and operation. No walking around the machine is needed, it is said, as the operator can produce a complete core without leaving his original position. The machine then places the core directly in front of the operator, making removal easy and rapid. Locking and leveling are performed by a half-revolution of a lever on the machine, no clamps being required. The core box is then rolled over with the left hand, while with the right hand the draw lever is operated to draw the core and automatically swing it into position for unclamping. It is claimed that only a few seconds is needed to perform a complete operation.

Chromium Plated Sheets

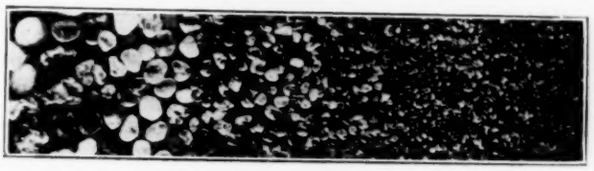
A new product, important from the views of both the plating and the metal fabricating industries, has been developed and placed on the market by The Apollo Metal Works, La Salle, Ill., in the form of sheet metal which is fully chromium plated and ready for fabrication into products on which a chromium plate finish is desirable. The sheets, according to the company's announcement, have been fully developed and are being produced in commercial quantities, to be sold under the name of Apollo Chrome. As far as known, this is the first venture of this sort where chromium plate has been applied, it is stated.

The company states that the sheets have the advantage of being workable immediately into finished products which do not require plating after fabrication. The sheets are suitable for use in a variety of work, among which are the following: automotive, jewelry, plumbing, refrigeration, railroad, radio, surgical supply, air transport and restaurant ware. The sheets have the well known advantages of chromium plate in such respects as resistance to rust and other corrosion and erosion, perpetual brightness and enduring hardness of surface, according to the producers, who state that they are desirous of co-operating with users in applying their product to use in any line where it may be suitable.

The Apollo Metal Works maintains plants at La Salle, Ill., where its general offices are, and at Bethlehem, Pa.

Flint Foundry Sand

George F. Pettinos, 1206 Locust Street, Philadelphia, Pa., dealers in foundry sand and other supplies, has placed on the market a new type of foundry sand known as Foundry Flints, for which



GRAINS OF FOUNDRY SAND

several important advantages are claimed. The company has opened a large deposit of this material in southern New Jersey, as well as a new screening and washing plant, a new activity for the Pettinos company.

It is stated that each grain is pure flint, thoroughly washed and accurately screened to meet the needs of exacting foundrymen. The illustration shows some of the grains of this type of sand, the gradations in size and the smoothness of all grains being visible in the picture.

It is claimed that the smooth, round surface of the grains makes this a superior sand for mold and core work as a minimum of surface is obtainable. This is said to be especially desirable for cores which must be coated with oil. Permeability, permitting escape of gases and the necessity of only a minimum amount of oil on cores are other advantages claimed for this product.

New Protective Hand Cream

The research laboratories of the General Electric Company, Schenectady, N. Y., have developed a protective hand cream which is furnished as a safety measure to those men in the General Electric plants whose hands and arms are exposed to oil, grease, dirt, varnish, paint and other causes of skin discoloration and irritation encountered in industrial processes. It is applied before beginning work and forms an invisible film which quickly dries and is not slippery. Subsequent washing in warm water quickly removes the film and with it the stains which otherwise fill the pores of the skin and are difficult to remove, and which are likely to cause infection.

This cream has now been placed on the market by the merchandise department of the company at Bridgeport, Conn. It will be packed in tubes for individual use and also in one pound cans for industrial use.

Equipment and Supply Catalogs

Pickling Equipment. The Weaver Brothers Company, Clinton, Michigan.

Rotatory Compressors. R. Planche et Cie., Villefranche, Saone, Rhone, France.

Portable Direct-Reading Slide Wire Ohmmeters. Roller-Smith Company, New York.

High Grade Acid Proof Chemical Stoneware. General Ceramics Company, New York.

Outdoor Recreation for Employees. Metropolitan Life Insurance Company, New York.

It's Up to Ajax. Ajax Metal Company, Philadelphia, Pa. Interesting data on ingot metals.

Eagle Brand Copper Products. Taunton-New Bedford Copper Company, Taunton, Mass.

Thermostats for Industrial Appliances. Robertshaw Thermostat Company, Youngwood, Pa.

Electric Furnaces. Ajax Metal Company, Philadelphia, Pa. Interesting booklet on Ajax-Wyatt furnaces, giving specifications, illustrations, etc.

Fire Protection and Safety Equipment. Schwartz Brothers, 104 North Eighth Street, Philadelphia, Pa.

Aviation Teaches Industry a Lesson. The Abbott Ball Company, Hartford, Conn. Ball burnishing materials.

Getting Facts About Accidents. Metropolitan Life Insurance Company, New York. Also, **The Employment Interview.**

The Handy Book of Silver Solder. Handy and Harman, 57 William Street, New York. A valuable book on the proper selection and use of silver solder. Covers all phases of this branch of metal working.

General Electric Company, Schenectady, N. Y., publications: Direct-heat Electric Furnaces; Direct-current Crane and Hoist Motors; Arc Welding in G-E Factories; Arc Welding in Industry; Totally Enclosed Motors for Portable Hoists; G-E Automatic Tank Welder.

Associations and Societies

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

American Foundrymen's Association

HEADQUARTERS, 222 WEST ADAMS STREET, CHICAGO, ILL.

The annual meeting of the Board of Directors of the American Foundrymen's Association was held in Chicago on July 16. Following the reports of officers, the reports and recommendations of committees at members' sessions at the Philadelphia convention were considered.

The reports of judges of apprentice molding and pattern making contests were approved and the awarding of certificates and prizes authorized.

President Utley submitted a report which provided a well defined and comprehensive program for the newly created Educational Committee authorized at a meeting of the Board held during the last convention week. Following discussion the report was approved by the board, whereupon President Utley stated that he would announce the personnel of the committee when all appointments had been accepted.

The meeting approved a recommendation that the A. F. A. encourage the organization of a representative group of non-ferrous foundries for the purpose of developing a uniform cost system for non-ferrous foundries.

The recommendation of the Joint Committee on Molding Sand Research that two tentative procedures for testing sand be advanced to standard, that two new tentative procedures be established, and some minor changes be made in the wording of others to clarify the test, was approved and the printing of a new pamphlet showing standard and tentative methods of tests for molding sand was authorized.

In response to requests received from a number of sources, the board authorized the appointment of a committee to consider the advisability of sponsoring a joint committee to draft uniform trade customs for the casting industry, said committee to report at the next board meeting.

The board proceeded to organize by re-electing C. E. Hoyt executive secretary-treasurer and manager of exhibits; R. E. Kennedy, technical secretary, and electing directors S. W. Utley, A. B. Root, Jr., S. C. Vessy and A. E. Hageboeck to serve with the president, vice-president and executive secretary as members of the executive committee.

The resignation of W. D. Goldsmith as a director was accepted and the board filled the vacancy by electing H. Cole Estep, of the Penton Publishing Company and chairman of the committee on international relations, a director.

Following consideration of various plans, the board voted unanimously in favor of holding the 1929 convention at the Stevens Hotel, Chicago, the week of April 8, and to hold in conjunction therewith, in the exhibition hall of the hotel, a non-operating, limited space exhibit. The details of arrangements for the first exhibit of this character at an A. F. A. convention were left to the executive committee.

American Electrochemical Society

HEADQUARTERS, COLUMBIA UNIVERSITY, NEW YORK CITY

Plans are materializing for a splendid meeting on September 20, 21 and 22. There will be an outing on Friday afternoon, and on Thursday evening there will be an old-fashioned Southern smoker.

Scientific sessions will be held Thursday and Friday mornings and Thursday afternoon. A special feature will be the symposium on "Chemical Reactions at 1,000° C. and Above." Another session will be devoted to the "Chemistry and Metallurgy of Nickel." A large number of papers have already been received.

The headquarters of the fall meeting will be Hotel Kanawha, at Charleston, W. Va., and every member is urged to make his reservation well in advance of the meeting for September 20 and 21.

Saturday morning will be spent at the International Nickel plant at Huntington. As this is a distance of about 50 miles from Charleston, the members will be conveyed by bus direct to the plant. Other plants in Charleston and vicinity will be visited.

New York Branch, American Electroplaters Society

HEADQUARTERS, CARE OF R. J. LIGUORI,, 2429 HUBBARD STREET, BROOKLYN, N. Y..

CHANGE OF ADDRESS

The address of Ralph J. Liguori, secretary-treasurer of the New York Branch, is now 2429 Hubbard Street, Brooklyn, N. Y. All communications to the secretary or treasurer are to be sent to that address hereafter.

Non-Ferrous Ingot Metal Institute

HEADQUARTERS, CARE BENJAMIN HARRIS & COMPANY, CHICAGO, ILLINOIS

A new organization in the metal field, to be known as the Non-Ferrous Ingot Metal Institute, was formally organized at meeting on July 20, 1928, at Atlantic City. The following were elected officers:

President, Benjamin Harris of Benjamin Harris and Company; vice-president, I. Gleuck of the Federated Metals Corporation; treasurer, L. Chapman of H. Kramer and Company; members of executive committee: William Lewin, Lewin Metals Corporation, and W. J. Coane, Ajax Metal Company. R. D. T. Hollowell, experienced in trade organization work and at present secretary-treasurer of the American Face Brick Association, will shortly assume the management of the Institute. The headquarters will be in Chicago.

Most of the principal producers of non-ferrous ingot metals were present at the meeting and a constitution and by-laws were adopted. The object of the organization, according to a statement by President Harris, will be "to develop policies which will be of constructive benefit to the ingot producers and the consuming public." First the Institute will survey the needs and problems of the industry and later it will determine what activities to engage in. "Later," said Mr. Harris, "we will undoubtedly commence extensive technical research work on metals, covering improvement of manufacture, extension of uses, standard specifications, business practices, and prevention of trade abuses."

Brass Founders of New England

HEADQUARTERS, BOSTON, MASS.

A Providence council of the Associated Brass Founders of New England was organized in Providence last month at the annual business meeting and banquet of the parent body, held at the Narragansett Hotel, Providence, R. I. A committee of three was elected to supervise the formation of the new branch. The association, which has for its purpose "the mutual dissemination of knowledge gained through research in the individual concerns of the non-ferrous industry," chose as its local leaders Wendell MacIntosh, of the Stillman White Foundry Company, James J. McKenna, of the City Brass Foundry, of Pawtucket, and Robert P. O'Brien, of the R. P. O'Brien Company. J. A. Duncan, of East Boston, president of the association, briefly outlined and explained the nature and work of the organization. Other speakers were George W. Thornberg, C. A. Perkins, L. P. Robinson, Oscar Swangren and H. E. Bryant.—W. H. M.

British Institute of Metals

HEADQUARTERS, 36 VICTORIA STREET, WESTMINSTER, LONDON, S.W.1

The Council of the British Institute of Metals has accepted an invitation from the Verein Deutsche Ingenieure and the Deutsche Gesellschaft für Metallkunde to hold next year's autumn meeting of the Institute in Germany. The meeting will take place at Düsseldorf. It is expected to prove very attractive not only to British members but also to members resident in other countries, who number many hundreds

Personals

Robert Thurston Kent

Robert Thurston Kent of New York City has been engaged by Divine Brothers Company of Utica, New York, to be manager of their sales and engineering departments.

Mr. Kent is an engineer of international reputation. He is the editor and author of "Kent's Mechanical Engineers' Handbook," known throughout the engineering world as "The Engineers' Bible." Mr. Kent is prominent in the affairs of the American Society of Mechanical Engineers, being chairman of the Standing Committee on Professional Divisions, and former chairman of the Management Division.

ROBERT T. KENT

In 1924 the Government of Czecho-Slovakia requested the American Engineering Council at Washington to send to Czecho-Slovakia a delegation of scientists and engineers representing textile, metal manufacture, railroads, and other major industries, to advise it on the establishment of American methods in that country. Mr. Kent was the chairman of this delegation, which consisted of about twenty men. Upon his return from Czecho-Slovakia he laid aside his personal business for several years at the request of Governor Smith to act as Superintendent of Prison Industries of New York State, and reorganize the industries in the State's prisons.

Mr. Kent has been a consulting engineer for many years, and has been employed by various large interests throughout the United States. Before coming to Utica he was general manager of the Bridgeport Brass Company, Bridgeport, Connecticut. He is a graduate of Stevens Institute of Technology, 1902, with the degree of Mechanical Engineer.

Mr. Kent assumed his duties with Divine Brothers Company on July 15th.

Joseph P. McGinnis is now president and general manager of the E. R. Caldwell and Son Brass Company, Syracuse, N. Y.

Clarence Fynaut, formerly with The Summit Foundry Company, Geneva, N. Y., is now associated with The Ferro Enamel Supply Company, Cleveland, Ohio, as a member of its service staff.

Col. Harry C. Wilder has resigned his position as director of sales for the Northern New York Utilities, Inc., and will take charge of the public utilities sales for the Rome Wire Company, Rome, N. Y.

Howard E. Boardman has resigned his position as manager of the sales and engineering departments of the Divine Brothers Company, Utica, N. Y., to accept a position with a large organization in New York City in another line of business.

W. Roach has been appointed assistant manager of sales in the mill products division of the Mueller Brass Company, Port Huron, Mich. He was formerly associated with the American Brass Company as manager of the sales promotion department of the Buffalo branch.

Dr. Robert J. Anderson, sailed from New York on August 1 on the Aquitania, accompanied by Mrs. Anderson, for an extended business trip abroad. Dr. Anderson is vice-president in charge of production of the Fairmont Manufacturing Company, Fairmont, W. Va., manufacturers of rolled aluminum products.

W. Scott Thomas, 303 National Exchange Bank Building, Providence, R. I., has been appointed New England representative for the sale and distribution of Axmann universal sand-throwers and accessory equipment manufactured by The Axman Sand-Throwing Machine Company, Cleveland.

William J. R. Kennedy

William J. R. Kennedy, recently elected second vice-president of the American Electroplaters' Society, has been foreman in charge of the finishing department of the Westinghouse Electric and Manufacturing Company, East Springfield, Mass., since March 1920.

He was previously connected with the Stevens-Duryea Auto Company, of Chicopee Falls, in a similar capacity.

Mr. Kennedy is a past president of the Hartford, Connecticut, Valley branch of the American Electroplaters' Society, and has written a number of articles on the cleaning, polishing and electroplating of metal parts of all sorts.

WILLIAM J. R. KENNEDY

John S. Sammons

John S. Sammons has been appointed general manager of the American Foundry Equipment Company, Mishawaka, Ind. His appointment took effect July 1, 1928.

Mr. Sammons has had an extensive experience in the foundry equipment business. Starting his career in industry at fourteen, when he became a drill press operator at the Andrews Iron and Wire Works, Rockford, Ill., he made steady progress and eventually became an important executive with several large companies. During the past fifteen years he has been associated with these in a variety of capacities, chiefly in sales and management.

From 1926 until his recent move to the American Foundry Equipment Company, Mr. Sammons was sales manager for the Beardsley & Piper Company, Chicago. While with this concern he visited over three hundred foundries throughout the United States, becoming personally acquainted with the problems and requirements and other aspects of the industry. This wide experience will stand him in good stead in his new position.

Elliot E. Van Cleef, 53 West Jackson Boulevard, Chicago, Ill., has been appointed Chicago district agent for The Roller-Smith Company, New York, manufacturers of electrical apparatus. **Michael B. Mathley,** who has been connected with the company's Chicago office for many years, will be associated with Mr. Van Cleef.

Grant B. Shipley, engineer, of Pittsburgh, Pa., has been elected a director of the Mond Nickel Company, Limited, of England and Canada. For some time Mr. Shipley has been Chairman of the board and president of the American Mond Nickel Company, the United States branch of the Mond Nickel Company, Limited.

Clark H. Foster has resigned as general manager of the Tolhurst Machine Works, Troy, N. Y., after more than twenty years in that position. **T. A. Bryson,** who has been chief engineer of the Tolhurst plant for over fifteen years, has taken the position left by Mr. Foster. Mr. Bryson has been actively engaged in the design of centrifugal machinery.

Sam Tour has resigned his position as metallurgist for the Doehler Die Casting Company, New York. He had been in charge of the company's plant at Batavia, N. Y. Mr. Tour will be succeeded by **G. W. Johnson,** who has been appointed chief metallurgist at the Batavia plant. Mr. Johnson was in the company's employ as research metallurgist during the years from 1921 to 1923 inclusive, and subsequently took charge of the metallurgical work of the Precision Die-Casting Company; later still he was with the Crucible Steel Company.

Obituaries

George Edward Trumbour

George Edward Trumbour of Butler, N. J., a pioneer in the hard rubber industry and known to the electroplating and metal industries through his development of metal molds for rubber forming and of hard rubber linings for plating tanks, passed away on July 23, 1928, after about four months' illness. Mr. Trumbour was seventy-two years of age and had retired from business in 1922.

George E. Trumbour started his career in industry while still a boy at Boonton, N. J., where he was born. His first position was with a tack-making concern, where he started to learn the trade. Later, he turned his attention to the manufacture of nails, in which industry he obtained positions first at Somerset, Mass., and then at Montreal, Canada. At the latter city he was employed by the Watson Rolling Mill Company. After some time, he left Canada and returned to the plant of his former employer at Somerset, where he stayed until March, 1878, when he went to Bloomingdale, N. J., to take up the work of rubber pressing pistol handles. He retained his position when his firm was succeeded by the Butler Hard Rubber Company, Butler, N. J. In this plant Mr. Trumbour did some of his finest work, earning promotion steadily until, in 1886, William Kiel, then superintendent of the works, made him foreman of the pistol handle department. It was Mr. Kiel's belief that Mr. Trumbour was a great expert in the hard rubber field, and as time went on the young man's duties and importance in the company steadily increased. He became manager of the entire dress-bone and casting department. In this capacity his attention turned to metals used in molding rubbers.

When the American Hard Rubber Company was formed in 1898, the Butler concern was absorbed and Mr. Trumbour became chief assistant to William Kiel, who continued as superintendent of the plant, and who retained Mr. Trumbour as his chief assistant in the gum and molding departments. Here Mr. Trumbour perfected a method of vulcanizing hard rubber in gas presses, a development which was so successful as to be adopted by the rubber industry throughout the world. His importance in the industry grew until it was the belief of his superiors that he was the most expert rubber compounder in the world. Later he did considerable work in perfecting a means of lining tanks with hard rubber and his efforts were beneficial to the plating trade, which favorably received some of the smaller rubber-lined tanks for use in plating.

Mr. Trumbour is survived by two sons, George W. Trumbour, Boston, Mass., and Thomas A. Trumbour, Hawthorne, N. J., who is Business Manager of THE METAL INDUSTRY; two daughters, Mrs. Margaret Riley and Mrs. Eulalia Dwyer, both of Butler, N. J.; four sisters, a sister-in-law, and sixteen grandchildren.

Mr. Trumbour was interred at St. Mary's Cemetery, Boonton.

Edward H. Spencer

Edward H. Spencer, who, as paymaster for the American Screw Company of Providence, was assaulted and robbed of a $6,000 payroll as he was entering the company's office on Eddy street, March 7, 1922, died early on Monday, July 9, at his home, 107 Lexington avenue, on his 81st birthday. He had been ill several weeks.

Mr. Spencer was born in Providence, where he had lived all his life. For 35 years he was employed by the American Screw Company, retiring four years ago. At the time of the robbery he was entering the Eddy street plant of the company with the money in a metal cash box, early in the afternoon, when a man hit him over the head with a blackjack, grabbed the box and fled in an automobile. Another $1,800, which Mr. Spencer had left in his machine, was overlooked by the thief.

Mr. Spencer's only surviving relative is his widow, Mrs. Abbie A. Spencer. —W. H. M.

Walter F. Field

Walter F. Field, vice-president of the General Cable Corporation and president of the Safety Cable Company, Bayonne, N. J., which is a subsidiary of General Cable, died on July 7, 1928, in his sixtieth year.

Mr. Field had a long career in the wire and cable business. At one time he was sales manager for the Phillips Wire Company, Pawtucket, R. I. From that concern he went to the Safety Cable Company which afterward took over the Phillips company. He became president of the Safety Cable Company and when that company took part in the large merger which resulted in the organization of the General Cable Company, Mr. Field was elected vice-president and a member of the executive committee of the parent company.

C. C. Eagle, Jr.

C. C. Eagle, Jr., Philadelphia district manager for the Bristol Company, Waterbury, Conn., died suddenly of heart disease on June 5, 1928, while on a train bound for Wilmington, Del. Mr. Eagle was forty-four years of age, a graduate in electrical engineering from the University of Wisconsin, and had been employed by the Bristol Company since 1918, when he entered that company's Chicago office. Previous to that he had been a purchasing agent for the Western Electric Company.

News of the Industry

Industrial and Financial Events

General Electric Company

Orders received by the General Electric Company for the three months ending June 30 amounted to $90,431,957, compared with $78,105,247 for the corresponding quarter of 1927, an increase of 16 per cent, President Gerard Swope has announced.

For the six months ending June 30, orders received amounted to $170,357,797, compared with $155,655,828 for the first six months of last year, an increase of 9 per cent.

General Electric Company sales billed for the first half of 1928 amounted to $158,015,221.41, compared with $149,795,026.99 for the corresponding period last year. Profit available for dividends on common stock for the first half of 1928 was $24,388,002.58, compared with $22,542,972.26 for the corresponding six months last year.

Henry V. Walker Company Expands

Henry V. Walker Company, 17 John Street, New York, manufacturer of lacquers and enamels, recently expanded the scope of its business. Having moved into larger offices in the Tyler building, it has established a new branch warehouse in Cincinnati, Ohio, for the purpose of facilitating the requirements of its western trade. W. S. Elwin is the firm's representative. With experience of quarter of a century in the lacquer business, it is stated, he is fully qualified to handle the requirements of all patrons, and to give expert servicing, when necessary, in the finishing room.

Girard Smelting Buys Plant

The Girard Smelting and Refining Company, Philadelphia, Pa., non-ferrous metal producers, have purchased the plant of the Tacony Steel Company, on the Delaware River and on the main line of the Pennsylvania Railroad, in Philadelphia. There are 46 acres of land and about 30 buildings, making a plant well suited for metal smelting and refining. The new owners plan the installation of new, modern equipment and some alterations, all of which will require about a year to do. When the plant is complete, the Girard company will move into it its entire business, now housed in two plants at Philadelphia.

Fairmont Manufacturing Company

Lawrence M. Brile, formerly vice-president in charge of sales, has been elected president of the Fairmont Manufacturing Company, Fairmont, W. Va. Certain other changes have been made in personnel, as follows:

Dr. Robert J. Anderson was elected vice-president and is now in charge of production at the company's rolling mills at Fairmont. John N. Brenza, formerly manager of the company's Cleveland, Ohio, office, is now sales manager at Fairmont. T. A. Lynch is now assistant to the president.

Doehler Die Casting Company

The net income of the Doehler Die Casting Company, New York, for the second quarter of 1928 was $226,479 before federal taxes, equal to $1.28 a share on common stock after preferred dividends. On the same capital basis, the income for the corresponding 1927 quarter was $110,103, or 50 cents a share. The net for the first six months of 1928 was $431,204, which compares with $238,070 for the same 1927 period.

Edison and Splitdorf Affiliate

Thomas A. Edison, Inc., West Orange, N. J., and the Splitdorf-Bethlehem Electrical Company, Newark, N. J., have affiliated in the manufacture of radio receivers, electric talking machine apparatus and similar products.

The companies will operate separate plants, as in the past, but patents will be exchanged and production increased.

Morton B. Smith Company Dissolves

The Morton B. Smith Company, 241-243 Front Street, New York, dealers in old metals, has decided to discontinue business. As soon as the warehouses are sold, Morton H. Smith, president, will retire and J. W. Straub, vice-president, will continue some of the lines but without a warehouse. For the present, his address will be 241 Front Street, New York. The company is the oldest non-ferrous scrap metal house in the United States, having been established in 1847.

Savage Arms Corporation

The new common stock of the Savage Arms Corporation, Utica, N. Y., has been placed on a regular quarterly basis of 50 cents a share, equivalent to $2 per year. The company's old stock was recently split on a two-for-one basis. Earnings for the second quarter of 1928 were $234,831 as against $174,161 in the same 1927 period.

Platinum and Allied Metals in 1927

The platinum refiners of the United States in 1927 purchased 236 ounces of crude placer platinum of domestic origin and 48,907 ounces of foreign crude platinum, according to J. M. Hill, of the United States Bureau of Mines. In 1926, the refiners purchased 171 ounces of domestic crude platinum and 43,096 ounces of foreign crude platinum. Domestic material purchased in 1927 included 10 ounces from Alaska, 189 ounces from California, and 37 ounces from Oregon. Purchases of foreign crude platinum in 1927 were: Australia 1,390 ounces, Canada 19 ounces, Colombia 43,557 ounces, Russia 17 ounces, and South Africa 3,924 ounces.

Schaeffer and Budenberg Company

The American Schaeffer and Budenberg Corporation, Brooklyn, N. Y., one of the oldest and largest industrial instrument manufacturers in the country, has been purchased by Manning, Maxwell and Moore, Inc., Brooklyn, N. Y., producers of machinery and tools. The American Schaeffer company has plants in Brooklyn and Worcester, Mass., and had been owned by Ralph Jonas and associates since 1920. The company was founded in 1851. Its products include gauges, valves, steam traps, thermometers, temperature controllers, etc.

Production of Cadmium in 1927

The production of metallic cadmium in the United States in 1927 amounted to 1,074,654 pounds, an increase of 33 per cent over production in 1926, as reported by producers to the United States Bureau of Mines. The market quotation on American metal, New York, remained at 60 cents a pound throughout 1926 and 1927. There were 22,400 pounds of cadmium, valued at $13,172, imported into the United States during the last quarter of 1927. No imports of this metal were recorded for 1926 or the first three quarters of 1927.

In addition to metallic cadmium, domestic manufacturers reported some production of the following cadmium compounds, all in larger quantity than in 1926: Cadmium sulphide, cadmium hydrate, cadmium oxide, and cadmium lithophone, but figures are not available for publication.

Incorporations

The following new concerns have been granted charters during the past month:

Border Metal Products Company, Inc., 1449 Niagara Street, Buffalo, N. Y.; manufacture nickel and aluminum stove pipe, hot air registers and sheet metal articles, including Climax paper clips; the company's plant is at above address and it will soon be in market for materials and equipment.

Titan Ornamental Iron Works, Inc., 2237 West 35th Street, Chicago, Ill.; capital, $30,000; manufacture ornamental brass, bronze and iron, etc., and operate fabricating shop; incorporators: F. N. Karabin, H. C. Gradous, E. G. Karabin.

Erie Resistor Corporation, Erie, Pa.; capital, $25,000; to manufacture electrical products of brass, copper, carbon, etc. Organized by G. P. Fryling, St. Mary's, Pa., and G. G. Herrick, Erie, Pa.

Natural Products Company, Inc., 46 West Chestnut Street, Reading, Pa.; to operate warehouse for distribution of foundry supplies and to operate sand banks; Warren S. Adams is president and R. B. Harrison, the active official, is secretary-treasurer.

Union Chandelier Company, Newark, N. J.; capital stock, $25,000; to manufacture lighting fixtures, with casting, cutting-up, spinning, zincing and tinning shops, etc. Address in care of J. H. Hecht, 207 Market Street, Newark.

Business Reports of The Metal Industry Correspondents

New England States

Waterbury, Conn.

AUGUST 1, 1928.

The American Brass Company and the Chase Companies, Inc., have joined with firms and individuals in towns and cities along the lower Housatonic in urging the federal government to deepen the river up to Derby, Ansonia and Shelton. Recommendations from these firms were submitted to the Rivers and Harbors Board at the hearing it held on the project in Washington on July 24. It was pointed out that deepening the river would result in expansion of the industries there and would encourage other industries to locate there. The American Brass Company has two plants in Ansonia, and it is understood that if the river were deepened it would receive much of its raw material by water and ship some of its finished products by water. Frederick S. Chase, president of the Chase Companies, when asked by THE METAL INDUSTRY concerning the action taken, said that his concern did not feel the project would benefit it directly, but that as the American Brass was interested he was glad to support the other as a friendly competitor. The Chase Companies' support was based on the idea of community interest and improvement of the entire section rather than on personal interest, he said. He said he doubted if it

would be practical for his concern to truck its raw material and finished products to and from Waterbury and Ansonia, utilizing water transportation from those points. The Connecticut Light and Power Company has a plant there, and if the river were deepened it could obtain its coal by water, resulting in the production of power at lower cost, and as the Chase Companies as well as all other concerns in Waterbury buy power from the company, all would benefit indirectly by the river deepening, he said.

The Waterbury Fastener Company has been authorized by the Secretary of State to increase its capital stock from $50,000 to $250,000. The company will issue 200,000 shares of common and 50,000 shares of preferred stock in place of the present stock. Each share will have par value of one dollar. The papers filed at the Secretary of State's office were signed by John Draher, Malcolm J. Ford and George F. Pullen, directors. Mr. Draher, vice-president of the company, said that the increase is for the purpose of utilizing the surplus funds that the concern has on hand.

The Robinson Tool Works, Inc., at Baldwin street and Kelsey avenue, has been consolidated with the Cole Lock Nut Company of Poughkeepsie, N. Y., and will do business under the name of the Robinson-Cole Grip Nut Company. Incorporation papers have been filed. The new concern will have capital stock of $125,000, of which $87,750 is already in. There will be 2,500 shares of stock with a par value of $50. Edward J. Cole, of Poughkeepsie, will be president and Thomas D. Robinson, of this city, former president and treasurer of the local concern, will be treasurer and will continue as mechanical superintendent of the local plant. William F. Walsh, of West Haven, will be secretary. Both plants will continue operations as before, and an addition will be built to the local plant, which will also manufacture some of the products formerly made by the Poughkeepsie concern.

Most of the local factories were closed for periods ranging from one day to two weeks over the Fourth of July holiday. The Waterbury Clock Company closed for two weeks for inventory and repairs; the Berbecker & Rowland Company, the Plume & Atwood Manufacturing Company, the Mattatuck Manufacturing Company, the American Ring Company, A. H. Wells & Sons, the Waterbury Rolling Mills Company and the American Pin Company branch of the Scovill Manufacturing Company, all closed for one week. The other departments of the Scovill Manufacturing Company and the American Brass Company, the Chase Companies, Inc., the Bristol Company, the French Manufacturing Company, the International Silver Company, the Randolph-Clowes Company, the American Mills Company, the Waterbury Farrel Foundry and Machine Company, the Steele & Johnson Manufacturing Company, the E. J. Manville Company, the Waterbury Button Company, the Waterbury Buckle Company, the Blake & Johnson Company, the Smith & Griggs Company, the Patent Button Company, and the Shoe Hardware Company closed for but one day.

The Blake & Johnson Company, which some time ago sold to the Torrington Manufacturing Company the business of its machinery division, is now disposing of the tools and equipment of the latter division. This division, located on North Elm street, has been closed ever since the sale of the machinery business. The other division, which is located in Waterville, has continued to manufacture small metal articles, rivets, screws, studs, nuts, piano hardware and specialties. It is expected that the North Elm street plant will be sold after the machinery and equipment is disposed of. The company was organized in 1852.

John V. Montague, assistant controller of the Scovill Manufacturing Company, was one of the principal speakers at the joint conference held last month of the state branch of the National Association of Cost Accountants and the Manufacturers Association of Connecticut. J. Carlton Ward, Jr., vice-president of the Hartford Machine Screw Company, spoke on cost accounting from the sales and executive viewpoint.

Employes of the Waterbury Brass Goods Company attended the annual outing of the company in West Haven, July 14. The committee in charge consisted of Robert Zehender, Ralph Hubbers, Charles Follett, John McLean and Lewis Robinson.

E. O. Goss, president, Chauncey Goss, mill superintendent, Edward W. Goss, assistant to the president, were prominent at the annual outing of the Scovill Manufacturing Company employes at the Scovill reservoir in Wolcott last month. Airplane manoeuvers were given by Captain Arnold Rasmussen, Sergeant Kane, Captain Earl Fleet and Sergeant Frank Wright of the National Guard air squadron.

George A. King, superintendent of the manufacturing division of the Scovill Manufacturing Company, has received a patent on a hinged double-pin locking fastener. —W. R. B.

Bridgeport, Conn.

AUGUST 1, 1928.

An extension to the present foundry of the Bullard Machine Tool Company, to cost approximately $32,000, is now being constructed. It is to be 160 feet long and of concrete, brick and steel construction. Stanley H. Bullard, vice-president, says that the extension will be completed by the end of August. It will straighten out the foundry so that working facilities will be better.

Judge Alfred C. Baldwin of the superior court has issued a permanent injunction against the Remington Arms Company, Inc., restraining it from coaling its switching locomotives within 700 yards of the property at Seaview avenue and Grant street owned by Theresa and Michael Murde. At the same time, however, the decision is a victory for the company as the Murdes asked for $15,000 damages and an injunction to prevent the company from using its own railroad line. The judge refused to allow any damages or to restrain the company from operating the line. The Remington company and the General Electric Company, which also used the line, testified that they would have to close down and thousands of Bridgeport employes would be thrown out of work if operation of the line was forbidden. The judge ruled that the line is necessary to the very existence of the two companies and that they are necessary to the welfare of the city.

General Manager George E. Daniels, of the local plant of the Locomobile Company of America, emphatically denies that the plant will be dismantled and moved to Lansing, Mich. A small quantity of machinery from the local plant has been dismantled and shipped to Michigan, he said, but that was merely due to a change in production policy whereby several parts formerly made here will be made in Michigan and has no connection with the rumor that the local plant will be moved.

The Ives Manufacturing Company, which filed a petition in bankruptcy a month ago, must be sold at public sale rather than private, Judge Edwin S. Thomas of the United States District Court has ruled. Attorney Sanford Stoddard explained that an offer of $46,000 had been made, the buyer to assume all outstanding obligations and the cost of bankruptcy proceedings. The $46,000 would be added to the $60,000 accounts receivable and used to pay the general creditors, and it was assumed that the preferred claims would be paid by the purchaser. However, it came out that another offer of $47,000 had been made under practically the same conditions, and Judge Thomas said a public sale should be held. The sale will be handled by Attorney Jonathan Grout, appointed receiver in place of Charles R. Johnson, former president. A report of the condition of the company shows holdings of $214,000 subject to a mortgage of $139,000.

Local manufacturing heads held a meeting last month to make preparations for the announced trolley strike. Plans were made to supply cars to take the employes to and from work and to release for the service of the trolley company such employes of the factories as had had experience in operating trolleys. However, the strike was temporarily postponed as a result of mediation, so it was not necessary to put these plans into effect.

A. V. Bodine, vice-president of the Dictaphone Company, was given a farewell dinner by the officers and foremen of the plant at The Stratfield Hotel last month, prior to leaving to take a position with the Raybestos Company. Speakers were: L. C. Stowell, president of the company; J. L. McIntosh, treasurer; J. M. Lucarelle, general supervisor; R. E. Worden, purchasing agent; Manfred Johnson, research engineer; E. A. Carpenter and E. A. Gesner.

Secretary Robert Crosby, of the Chamber of Commerce, reports in his monthly survey for June as follows: Average weekly payroll $1,020,013. This is the largest figure so far this year and almost exactly the same as the average weekly payroll a year ago. This figure is encouraging as payrolls up to this time this year have shown a decrease over the previous year of from 3 to 10 per cent. The building permits issued during the month totaled $781,460, an increase of 121 per cent over the same month last year.

The Bullard Machine Tool Company has done more business during the first half of 1928 than it did in the entire year of 1927, according to President E. P. Bullard; unfilled orders at the present time are sufficient to keep the plant busy through the rest of the year. A second extra dividend of 50 cents a share is to be paid soon, making the total to be paid this year $2.50 a share. Stock is now selling at 70 to 74 a share. —W. R. B.

Connecticut Notes

AUGUST 1, 1928.

HARTFORD.—The Federal Trade Commission has filed a complaint against the recently organized Arrow-Hart & Hegeman Company, charging violation of the act against unlawful restraint of trade and monopoly. It charges that the corporation was formed with a $2,000,000 capitalization to acquire the stock of the Hart & Hegeman Manufacturing Company and the Arrow Electric Company, manufacturers of electric wiring devices, operating plants here and in New Jersey and Pennsylvania, and that the operation of these plants tends substantially to lessen competition in electric wiring devices, to restrain trade and to create a monopoly. Edward R. Grier, president, and Arthur L. Shipman, counsel of the firm, said the complaint will not have serious consequences. President Grier said he expected the commission would drop the case after a hearing. The amalgamation has been "good for Hartford, good for the stockholders and good for the customers," he said. Counsel for the company will file an answer to the complaint with the commission.

Sale of the Underwood Computing Machine Company, announced last month, to the Underwood-Elliott Fisher Company, has been authorized by the stockholders.

Earnings for the first half of the year at the Royal Typewriter Company amount to a sum in excess of $600,000 after taxes, depreciation and all charges, officers of the concern estimate. After preferred dividends this is more than $3.50 a share on 134,309 shares of common. Earnings on common for 1927 were $6.35 a share. The company is breaking ground for two new buildings. One will be five stories high and the other six stories. They will add more than 100,000 square feet of floor space and add about 20 per cent to the plant's capacity.

The Pratt & Whitney Company's six per cent preferred stock to the amount of $1,916,500 is to be retired at $100 as of December 31 with funds advanced to the company by Niles-Bement-Pond Company, the parent concern. The latter recently sold plants in Philadelphia and Plainfield, N. J., and will use the proceeds in retiring the local company's preferred stock.

The Pratt & Whitney Aircraft Company has received an order for 72 Hornet airplane motors and numerous spare parts from the United States Army. The value is placed at $671,620. Deliveries will run into next spring. This is the largest single order received from the army although the motors have been used by the Navy in large numbers for some time. This contract will increase unfilled orders on the company's books to $6,000,000.

NEW BRITAIN.—The New Britain Machine Company has commenced operating its special machine and machine tool departments on a day and a night schedule. This has meant the addition of 50 more men and places nearly 50 per cent of the plant on night work basis and full capacity for day work. Orders amounting to several hundred thousand dollars are now on hand.

Landers, Frary & Clark and North & Judd Manufacturing Company were closed for a week over July 4th for inventory and repairs.

MIDDLETOWN.—Directors of the Russell Manufacturing Company have declared a quarterly dividend of 1½ per cent, payable August 15 to stockholders of record August 9. For a few years recently no dividends were paid. This marks the third this year, and in voting it the directors also established it as the regular quarterly dividend.

The Remington-Noiseless Typewriter Company was closed for two weeks from June 30 to July 16 for repairs and inventory. The long shutdown caused a report that the plant would be closed indefinitely, but it was opened at the end of the period and most departments are working on a schedule of five and one-half days a week.

Negotiations for the reopening of the Kirby Manufacturing Company have been completed, John P. Bacon, trustee of the company, announced. However, only the new factory building and not the older, wooden structure will be used at present. A reorganization is being effected whereby Frank J. Brainard, of Portland, and Arthur J. Otterbein, of this city, will operate the plant. The latter was superintendent of the old plant. The old concern went into receivership some months ago. The new concern will make metal toys, as did the old one.

BRISTOL.—The New Departure Manufacturing Company is building a new road joining Terryville avenue and West street in order to expedite motor truck travel between its forge shop and its outlying plants. After grading, a coat of tar and sand will be put on.

TERRYVILLE.—The Eagle Lock Company, the Andrew Terry Company and the Chapman Machine Company closed down for one week over July 4th for inventories and repairs. A large number of employes continued to work during the shutdown.

The Eagle Lock Company directors at its meeting last month did not vote the extra dividend that has come to be looked upon as a matter of course, but only the regular quarterly dividend of 75 cents The par of the stock is $25. This makes the total dividend for the year 12 per cent, rather than 18 per cent, as in the past few years. The company's last report shows cash of $869,794, accounts receivable of $382,736, merchandise at $913,863, and among current assets an item of government securities amounting to $2,000,000. Against this there appears on the liabilities side an item of notes payable amounting only to $26,000. Because of this many investment experts in the state are criticizing as unnecessarily conservative the action of the directors in keeping dividends down.

KENSINGTON.—Stockholders of the Goss & DeLeeuw Machine Company have adopted a recommendation of the directors that the capital be increased from $200,000 to $300,000. The number of shares will be increased from 8,000 to 12,000. Stockholders are allowed to subscribe for the new stock in proportion to their holdings.

STAMFORD.—The Yale & Towne Manufacturing Company directors have declared a dividend of $1 a share out of past earnings, payable October 1 to stockholders of record September 7. The directors have denied that 500 employes are soon to be laid off. During the past year, because of a decline in business, the working force was reduced from 5,000 to 3,800.

NAUGATUCK.—A public meeting was held here for the purpose of devising plans for attracting new industries to the borough. It was held under the supervision of the Chamber of Commerce. Officials and employes of most of the local factories spoke. A number of empty factory buildings and available sites for buildings were mentioned. The Chamber of Commerce officials were asked to devise a specific plan to be presented at another public meeting soon.

TORRINGTON.—The Charlotte Hungerford Hospital here was the greatest beneficiary under the will of the late Uri T. Hungerford, formerly of this place, it became known when the transfer tax appraisal was filed in New York last month. The total it receives is over $2,500,000. It would have been more but for the fact that the New York laws forbid more than one-half the estate being willed to charity. In his will he left it $500,000 outright and half the residue of his estate. The Wolcotville School Society here receives $10,000 and the Y. M. C. A. $5,000. Mr. Hungerford was born in Torrington and headed the Uri T. Hungerford Brass and Copper Company, now owned by the Chase Companies, Inc.

THOMASTON.—The new four-story addition to the Seth Thomas Clock Company is nearing completion, and is expected to be available for production soon after September 1. It will mean almost a 50 per cent increase in the company's production. —W. R. B.

Providence, R. I.

JULY 31, 1928.

Fifty-nine corporations, representing the several metal lines and kindred and co-ordinate branches, will pay corporate excess taxes amounting in the aggregate to $74,151.31 to the State of Rhode Island this year, according to the annual statement of the Rhode Island State Tax Board.

This year the State of Rhode Island will obtain the largest income through tax assessment on manufacturing, mercantile and miscellaneous corporations, franchise taxes and public service earnings levies that it has ever received from these sources, surpassing the record established last year by $61,197.92. The tax list made

public the past month by the State Tax Board shows a total revenue of $1,950,629.82 to the State.

An analysis of the list shows that the metal trades experienced a slump during the year, several decreases, although small, being reported. The Brown & Sharpe Manufacturing Company, which last year jumped $974,551 this year fell off $107,824, its 1928 corporate excess being reported as $3,716,176.02. The Nicholson File Company was one of the few concerns in the metal group to report a gain, its corporate excess of $3,577,544 being an increase of $143,743.

Bridgeport Brass Company, of Bridgeport, Conn., has filed announcement at the office of the Secretary of State that H. B. Whitaker, 70 Clifford street, Providence, is its attorney of record in Rhode Island.

J. M. Carpenter Tap and Die Company, of Pawtucket, with an authorized capital stock of $150,000, consisting of 1,500 shares of common stock at $100 each, has changed its name to the Carpenter Holding Company.

The Speidel Chain Company has enlarged its factory owing to increased demand for its productions. The concern is now occupying the entire fourth floor of the new Doran building at 70 Ship street.

The Aetna Laboratories, Inc., of Providence, have been granted a charter under the laws of Rhode Island to conduct an electroplating business with an authorized stock consisting of 100 shares common no par value. The incorporators are: J. Andrew Clark, Manuel S. Bloom and Samson Nathanson, all of Providence.

The H. and S. Roofing and Sheet Metal Company, 92 Sackett street, Providence, is being conducted by Harry Goldenberg, according to his statement filed at the office of the City Clerk.

The Jewelers' Supply Company has removed from 36 Garnet street to its new factory at 1144 Eddy street, where it will have greatly increased quarters as well as additional production facilities.

The Automatic Gold Chain Company has added to its former floor space all the space on the ground floor of the Doran building at 70 Ship street, formerly occupied by Calvin Dean. Additional machinery and equipment are being installed, increasing materially the productive capacity of the concern.

Henry D. Sharpe, president of the Brown & Sharpe Manufacturing Company, of this city, is a member of the committee of the Chamber of Commerce of the United States that will make a study and report on the necessity for revising the present calendar from the standpoint of commerce, finance, industry and transportation.

Ralph K. Stone, formerly of the manufacturing jewelry concern of Chapin-Hollister-Stone Company, has entered business under the firm style of The Ralston Company, at 101 Sabin street, manufacturing a line of 14K goods.

Speidel Bros. have taken the entire fifth floor of the new Doran building, at 70 Ship street, giving them considerable additional floor space for the manufacture of watch bracelets, wrist strap buckles, springbars, etc.—W. H. M.

Middle Atlantic States

Newark, N. J.

AUGUST 1, 1928.

The property at St. Francis and East Ferry Streets, formerly occupied by the R. Newman Hardware Company, has been purchased by the Rauchbach-Goldsmith Company, manufacturers of trunks. The building contains about 150,000 square feet of manufacturing space, heavy mill constructed type. Part of the plant has been leased to the International Bed Company, manufacturers of metal beds, springs and cots. The lease covers a period of many years. The International Bed Company, of which Morris Goodman is president and Benjamin Goodman, vice president, is an offshot of the American Metal Bed Company, with which the Messrs. Goodman have been affiliated. Very extensive improvements are being made and it is possible that the bed company will be in complete possession in the near future.

The Hanson-Van Winkle-Munning Company, Matawan, N. J., manufacturer of electroplaters' and buffers' supplies, has purchased the Wickham Company of New Jersey at Matawan. It is said to be the largest plant of its kind in the world. The Wickham and Munning plants adjoin each other. For years the Wickham plant was used for the manufacture of piano plates and gray iron castings, but the factory has been closed for some months. The machinery was moved to a western plant.

Following Newark concerns have been chartered; Triangle Platinum Works, Inc., $100,000 capital; deal in precious metals. Agricultural Chemical Works, 200 shares no par; manufacture chemicals. Anserol Chemical Company, Inc., $125,000 capital; manufacture chemicals. Soshokes Laboratories, Inc., $75,000, manufacture chemicals. A. and W. Trading Company, 100 shares no par; deal in metals and alloys. Asoligraph Products Company, 100 shares no par, manufacture electrical devices. International Metal Bed Company, $125,000, manufacture metal beds. Charles Stumpfl, Inc., $100,000, manufacture surgical instruments.—C. A. L.

Trenton, N. J.

AUGUST 1, 1928.

Trenton plants engaged in the manufacture of metal articles report conditions are fairly good for this time of the year. The J. L. Mott Company is running five days a week, while the John A. Roebling's Sons Company is running normally. The Skillman Hardware Manufacturing Company is operating at 80 per cent of capacity, while the Trenton Emblem Company reports business picking up a little.

The following concerns have been chartered here: Niznite Metals Corporation, Carteret, N. J., $200,000 preferred and 2,000 shares common no par, to deal in metals. Pioneer Chemical Company, Passaic, $250,000, to manufacture chemicals. Victor's, Paterson, 1,250 shares no par, manufacture jewelry. Marley Chemical Company, Inc., $50,000 preferred and 1,000 shares no par, to manufacture chemicals.

The American Copper Products Corporation, Elizabeth, N. J., has let a contract for a one-story plant, 105 by 480 feet, brick and steel. The factory will cost $80,000.

Fire recently caused slight damage at the plant of the Type Metal Casting Corporation at Trenton.—C.A.L.

Middle Western States

Detroit, Mich.

AUGUST 1, 1928.

General business conditions in this territory have been fairly good during the last month, much better than was anticipated at first. The brass, copper, aluminum, and plating industries are considerably more busy than they were a year ago. The employment report from the Employers' Association, shows 80,000 more men at work now than a year ago. Production in the metal field is much heavier than it was a year ago. The greatest gain in production is by auto accessory concerns, a particularly active field. It is believed that industry has reached its height for the period and that slight recessions may be looked for. The outlook for the fall and winter months is favorable, particularly in the brass, copper, aluminum and gray iron field.

The Eastern Foundry Company, with headquarters at 520 Orleans street, Detroit, has become a corporation. Its capital stock is $10,000. It will deal in aluminum, bronze and brass castings. The stockholders are William P. Zeidler, William R. Mitchell, and Amos N. Culp, of Detroit. The Codde Manufacturing Company has also become a corporation. It has a capital stock of $50,000, and is engaged in brass, aluminum and iron products. The owners are H. A. Codde, Charles Marienthal and Max Schneider.

Earnings of the Campbell, Wyant and Cannon Foundry Company, at Muskegon Heights for the current quarter are expected to be in excess of those reported for the first three months of 1928, when earnings after all charges, including depreciation, interest and federal taxes, amounted to $435,064 or the equivalent of

$2.08 a share on the 209,548 shares of no-par common stock outstanding.

Construction is now under way at Pontiac, Mich., for a new foundry unit for the Pontiac and Oakland plants of the Oakland Motor Car Company. According to A. R. Glancy, president of the company, the new foundry will include six buildings and will add more than 200,000 square feet of floor space to the present factory group. The foundry is scheduled to be in operation late in February, 1929. It will have a capacity of 450 tons of castings daily.

Announcement is made of the opening at Pontiac, Mich., of the Pontiac Foundry and Machine Company. It is located in the Howard foundry building on Scott Lake road, west of the Dixie highway. The company produces brass, bronze and aluminum castings and other requirements for automobile, airplane and marine industries. C. D. Forester and George R. Fink of Detroit, and Robert Falstead of Birmingham, Mich., are the incorporators of the new company.

Plans for the construction of a $500,000 concrete dock and turning basin in the Saginaw river is announced by Arnold Lenz, general manager of the Chevrolet Motor Company, to be located north of its gray iron foundry in Saginaw. This improvement will make possible the shipment by water of foundry sand and coal to this branch plant.

The Wolverine Aluminum Company, 7000 Chatfield avenue, Detroit, has recently beeen incorporated. The stockholders are Harry J. Brooks, George R. Anthony and Charles C. Limbocker.

The Commonwealth Industries, with headquarters at 5922 Commonwealth avenue, Detroit, has been incorporated. It has a capital stock of $25,000 and will deal in brass and other metal articles. The stockholders are Charles G. Heilman, A. Gordon Spencer, and Harold M. Spears, Detroit.

Permit has been obtained at Grand Rapids for the construction of an addition to the plant of the Keeler Brass Company.

The Everett Winters Company, general contractors at Detroit, has been awarded the contract for addition to the aluminum foundry to be erected by the Packard Motor Car Company, at Detroit. It will cost $100,000.

The Bromley Electroplate Company is the name of a new concern recently incorporated with headquarters at 1462 Brush street, Detroit. It has a capital stock of $20,000. The stockholders are Edward Gasser, Edward H. Ritter and James Shields, all of Detroit.

Sales of the Kalamazoo Stove Company for the first five months of 1928 are reported to be 9 per cent ahead of the same period of 1927. Cash on hand is approximately twice that of a year ago.

—F. J. H.

Toledo, Ohio

August 1, 1928.

The non-ferrous metal plants in this territory are still maintaining a substantial production program. Also encouraging is the fact that it looks now as if present conditions may continue throughout the fall and well into the winter—perhaps longer.

The plating industry has been particularly favored. A great many plating plants are operated as departments of concerns engaged in various lines of production. With general business favorable, plating operatives have had a good month.

Accessory concerns also are bringing a good month to a close and will start August under the same favorable conditions. Most of the brass, copper, aluminum and gray iron concerns depend more or less on the prosperity of the motor car industry. This is true in Toledo as in other manufacturing centers along the great lakes. With practically all the automobile plants in good production, the accessory concerns can not help but be in the same condition. Many are working to capacity and others are even engaged in overtime production.

The employment situation which a year ago was not of the best is now most encouraging.

The 2,000,000th motor to be built by the Willys-Overland organization came off the line on July 2 and marked the greatest six months' production record in the history of the company. John N. Willys says his organization is in the middle of the most successful year of its history. —F. J. H.

Cleveland, Ohio

August 1, 1928.

Midsummer production is in fair volume throughout this territory. The non-ferrous metal plants are considerably in excess of the record for a year ago. A general increase in business has been the rule for the last several months and at the present time the industry seems to be settled down into a more or less favorable state.

Most of the copper, brass and aluminum plants are operating at capacity and there seems to be nothing to prevent a continuation of the present situation. There is a decided spirit of optimism and nearly every one believes the coming fall and winter will be far better than a year ago. Even though this is the vacation season there seems to be no inclination to slow production. Cleveland is a city of diversified industries and practically all of them are well engaged. Many of these are closely allied with the non-ferrous metal business. —F. J. H.

Chicago, Ill.

August 1, 1928.

Business interests in Chicago can save money and delays through litigation by use of commercial arbitration. The Illinois Chamber of Commerce is furnishing free service information upon this subject and reports an increase in the number of firms settling disputed claims in this manner.

The project of straightening the Chicago River has reached the point where actual work is to commence. This should bring about increased activity in the fields furnishing equipment and supplies necessary to such a huge undertaking.

The reduction of air mail postage rates, effective August 1st, should stimulate the use of air mail service. In anticipation of increased business via air route, many communities in Illinois are improving the landing fields, while other cities have announced programs that include new air ports. When this airport program becomes more effective, Chicago business can reach outside of the district and bid more favorably for new business.

Business in general is reported to be good, with a spotty tendency in varying lines. Chicago should not experience any depression of business because it is one of "the nation's busiest corners." Practically all transcontinental trunk lines enter Chicago. Railroad statistics show that fifty-five out of every one hundred loaded freight cars moved in the United States either originate in Illinois or pass through it on way to destination. Airplane routes also center in this district. This naturally will give impetus to all business and Chicago should be the richer for its position, no matter how we look at it. —W. S. H.

Other Countries

Birmingham, England

July 20, 1928.

Several of the non-ferrous metal trades of Birmingham have shared in the activity enjoyed by the makers of window fittings. The brass trade supplies a good deal of material in this connection but the demand for a higher standard of window display in the great cities has called for more artistic fittings, and several of the new alloys, such as white metal, improved bronzes and various polishes and finishes, including chromium, have enabled this demand to be met. In nearly every case Birmingham firms have been working full time and many are making overtime. Birmingham silversmiths have lately been busy on orders placed by America and Canada for reproductions of old Sheffield silver plate. This plate a century ago had a world-wide fame and though the old craftsmen have not all left successors, there are still clever artists who can reproduce silverware to compare with the ancient products.

The Department of Overseas Trade has been bringing pressure to bear on the makers of aluminum and cast iron hollowware to standardize and simplify the range of their manufactures with a view to the cheapening of production and more effectively meeting foreign competition. In this respect, it is pointed out by the Department, standardization and simplification are being pursued to the fullest extent in the two most serious competing countries, Germany and America. While the industries concerned are fully

aware of the wisdom of this policy, the plan will necessitate a considerable amount of plant reconstruction.

In the Birmingham electroplating industry unusual activity has prevailed amongst most firms since the year opened, and an encouraging feature is the wide distribution of the orders which arrive from such important centers as Buenos Aires, New Zealand, Shanghai and Calcutta. Several manufacturers who have reorganized their plants and premises state that they have so far had the best year in their experience, the only difficulty being some shortage of labor, which for the present cann t be supplied. The scale of wages is steadily rising. The industry is becoming less seasonal than at any time in its history. Home trade is variable. Hardware merchants find that goods in brass and other non-ferrous metals are being exported in larger quantities and Birmingham jewelry is more frequently called for.

Rolled copper tubes recently advanced ¼d per pound on account of the rise in copper values. There is still a good demand for copper tubes for water conveyance. British manufacturers, however, are beginning to feel the effect of setting up of factories in the Colonies, which means a reduction of business with the home firms. Copper water tubes are the subject of keen competition with Germany. In the brass fittings department a number of orders have been received lately from South Africa for railway carriage fittings and similar business has been done with India.

The manufacture of nickeled, brassed and coppered zinc sheets is practically a new British industry since the war. Formerly about 500 tons per annum were imported, but the making of sheets in Birmingham is now a very large industry and the quality is said to be superior to anything produced in Germany. Chromium plating is increasingly used for domestic purposes and metal firms are installing plants specially to deal with such goods as table ware, hearth furniture and bedsteads. The motor trade is also a good customer for chromium plated fittings.

The Standing Committee under the Merchandise Marks Act reported recently that it was not satisfied that an Order in Council should be made for imported sheet lead and lead pipes, including lead encased pipes and those known as "compo" pipes, to bear an indication of origin. The applicants were the British Lead Manufacturers' Association, Ltd., and the application was supported by the workpeople in the industry. The members of the Committee state that the only British products which might be confused with imported goods are those of manufacturers in this country who are not members of the applicant association, and the committee is not satisfied that these outside firms are generally in favor of the marking of the imported goods. The committee is also of opinion that an importation order would entail serious customs difficulties in the nature of possible damage and delay to goods.

The most up-to-date tin smelter in the world has been erected at Bootle. It will have at the start an output of 1,000 tons a month, and the plant has been so arranged that its capacity can always be doubled within six months. This smelter is entirely British owned and belongs to the Penpoll Tin Smelter Company. The ore to be smelted will be chiefly of Empire origin.—J.H.

Business Items—Verified

Combustion Engineering Corporation, 200 Madison Avenue, New York City, announces the appointment of W. O. Renkin as manager of the industrial furnace department, effective August 1.

The Ferro Enamel Company, Cleveland, Ohio, has added a business development department to its organization. This is in charge of **F. A. Close,** who has had similar experience in other lines of business.

The Cleveland Blow Pipe and Manufacturing Company, Cleveland, Ohio, has found it necessary to remove to a larger factory in order to accommodate its increasing business. The new address is 6505 Cedar Avenue, Cleveland.

Crown Pheostat and Supply Company, 1910 Maypole Avenue, Chicago, Ill., has just let a contract for a small addition to its plant. There will be about 2,000 square feet of floor space in the new portion.

American Tube Works, Boston, Mass., has announced the election of Charles B. Prince as treasurer and John J. Dervan as director and assistant treasurer, to fill the vacancies caused by the death of Harry W. Cotton.

Gibb Welding Machines Company of Bay City, Michigan, manufacturers of arc, spot, seam and butt welders, has increased capital stock by $125,000, making a total of $250,000, according to H. L. Clark, vice-president.

Bohn Aluminum and Brass Company's purchase of the Michigan Smelting and Refining Company, Detroit, Mich., has been approved by the stockholders of both concerns and the amalgamation will be carried through as announced recently.

Royal Plating and Polishing Company, Newark, N. J., has removed from 144 Bleecker Street to its new 2-story plant at 152 Bleecker Street, Newark. New chromium plating and other equipment is being installed. The company is headed by Frank P. Barile, president.

The Axmann Sand-Throwing Machine Company, Cleveland, Ohio, has appointed W. Scott Thomas, 303 National Exchange Bank Building, Providence, R. I., its New England representative for the sale and distribution of Axmann universal sand-throwers and accessory equipment.

The Metal Products Manufacturing Company, Minneapolis, Minn., has changed its name to the Thiem Manufacturing Company. The company, which makes metal specialties, operating stamping, tinning, soldering, lacquering, japanning and tool departments, will make no changes in personnel.

The Detroit-Michigan Stove Works, Detroit, Mich., recently awarded a contract for a large Manion-type continuous enameling furnace. This furnace is one of the latest developments in the porcelain enameling field and will handle large production. Installation is being made by **The Ferro Enamel Supply Company,** Cleveland, Ohio.

Leo Dynkin and Harry Shapiro, Jersey City, N. J., have leased the former plant of the American Wire Form Company at 265-73 Grant Avenue, Jersey City, which they will remodel as a metal novelty manufacturing works. Catalogs and price lists of equipment are requested. The company is to be known as the Jersey Tin Manufacturing Company.

Prairie Window Ventilator Corporation, 141 Georgia avenue, Providence, R. I., has been organzed to manufacture a patented window ventilator for home, office and factory use. Contemplates construction of addition to plant soon, at which time it will probably be in market for equipment and materials. The company was formerly known as **Metal Craftsmen, Inc.**

The General Electric Company has under construction at Erie, Pa., a new unit for producing complete G.E. porcelain enamel electric refrigerators. A strictly modern and up-to-date porcelain enameling plant which will be equipped with three large G. E. enameling furnaces is being installed by **The Ferro Enamel Supply Company,** Cleveland, Ohio.

Chandeysson Electric Company, 4092 Bingham Avenue, St. Louis, Mo., has filed plans for an addition to its punch press department. The first portion, 32 x 100 feet, will be completed this month and another small addition, about the same size, will soon be constructed for the housing of electric annealing furnaces, impregnation plant and drying ovens.

The Magnetic Manufacturing Company, Milwaukee, Wis., has discontinued its former sales office at Chicago and has opened a direct factory branch office at 211 North Desplaines Street, Chicago, Ill. All Chicago district business will now be handled from the new branch. The company manufactures magnetic separators and other special magnetic machinery.

Stanley Foundry Company, Grand Rapids, Mich., has acquired a portion of the plant of the National Brass Company of that city and will use this as a brass foundry, to be known as the Stanley Plant No. 2. The National Brass Company will continue to operate as in the past. S. D. Stanley and Samuel Silverman are the heads of the Stanley company.

Dedman Foundry and Machine Company, foot of Buffalo Street, Houston, Texas, recently formed, will operate a general ferrous and non-ferrous foundry jobbing shop. Patterns and iron, brass, aluminum and other castings will be produced and all kinds of machine work will be performed. Building and equipment has been acquired. The following

departments will be operated: foundry, brass machine shop, tool room, casting shop, brazing room.

Ira J. Owen Organization, Chicago, Ill., has entered the field of industrial management, sales and cost analysis, production methodizing, diagnosis of industrial ills and allied engineering work. The company is headed by Ira J. Owen, engineer, who has had twenty-five years' experience in analyzing, reorganizing and operating industrial and commercial plants. He is a Cornell graduate and a member of the American Society of Mechanical Engineers.

Alfred D. Guion and Company, Bridgeport, Conn., advertising, headed by A. D. Guion who at one time was connected with the Bridgeport Brass Company, has merged with the Rowland Advertising Agency, Bridgeport, making the Guion concern the only advertising agency in Bridgeport, according to the announcement. The company recently acquired the Morgan Service, a direct mail and multigraphing shop, which it now operates also. The Guion company is now equipped to handle every angle and branch of advertising work.

The Kirk and Blum Manufacturing Company, Cincinnati, Ohio, has closed contracts for blower systems with the following concerns:—John W. Brown Manufacturing Company, Columbus, Ohio; Edward Hines Lumber Company, Chicago, Ill.; Keeler Brass Co., Grand Rapids, Mich.; James Stewart Co., Chicago, Illinois; Union Battery Company, Memphis, Tenn.; Fostoria Glass Company, Moundsville, W. Va.; U. S. Playing Card Company, Cincinnati, Ohio; Armstrong Cork Company, Beaver Falls, Penn.; Adamston Flat Glass Company, Clarksburg, W. Va. The company has recently completed installations for the following:—The Maytag Company, Newton, Iowa; The Mengel Company, Louisville, Kentucky; The Reading Railroad Company, Reading, Penna.; M. A. Long Company, Baltimore, Maryland; Pittsburgh Plate Glass Company, Creighton, Pa.; Corning Glass Works, Corning, New York; Oakland Motor Car Co., Pontiac, Michigan.

Review of the Wrought Metal Business

By J. J. WHITEHEAD,
President, Whitehead Metal Products Company of New York, Inc.

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

AUGUST 1, 1928.

Business in the fabricated non-ferrous metals has continued through July on about the same level as in the previous months. There were no changes in price and business was in good volume, with the entire trade apparently well satisfied with conditions. Deliveries from some of the mills were at times subject to slight delay because of the difficulty in securing sufficient supplies of the ingot and cake copper. Although this condition has not yet become really acute, it is felt that supplies are not over-abundant and that trouble in this direction might easily arise. Large consumers have been advised to anticipate requirements as much as possible to insure their delivery position.

Sales of pure nickel and Monel Metal broke all previous records in July, with no indication of any falling off in the future demand. Consumers in this country and Europe are busy with construction contracts requiring Monel Metal for a wide and varied line of industries. There appears to be no slowing down in hotel and apartment house construction. In practically all of the new buildings of this class Monel Metal is specified for the kitchen and pantry work. Some outstanding projects in this line are the new Chateau Laurier Hotel at Ottawa, Quebec, the new Edgewater Beach Apartment Hotel in Chicago, the McCormick Memorial Y.M.C.A. in Chicago, and the General Motors' cafeteria in Detroit. There are many other buildings of a similar character going up and in practically all of them, including those mentioned, both food service and laundry equipment is being constructed of Monel Metal.

Manufacturers of nickel copper alloys are apparently well satisfied with conditions and are keeping their plants busy.

Having gotten well along into the time when a summer lull might reasonably have been expected, it is now felt that there need be no apprehension in that regard. The belief is that an optimistic feeling for continued good business in the fabricated metals in the Fall is justified.

Metal Market Review

By R. J. HOUSTON,
D. Houston & Company, Metal Brokers, New York

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

COPPER

AUGUST 1, 1928.

Stability continues to be an outstanding feature of the copper market. In fact, impressive strength has been a characteristic of the situation for many weeks. This condition is a reflection of fundamental soundness and the constructive measures that have been adopted by the industry. New demand was not in such heavy volume as a few weeks ago. Nevertheless, the July sales were on a good scale in the aggregate.

Prices have held up firmly at 14¾ cents delivered Connecticut Valley points and at 15 cents c.i.f. European ports. Nothing has interfered with the generally firm tone of the market. The movement of supplies in June was exceptionally large. Market closed firm at above-named quotations.

ZINC

Stabilization is coming into vogue as the order of the day for the leading metals. Now the zinc industry is turning to the solution of problems for the benefit of ore producers and smelters through a more satisfactory functioning of these groups. Recent market depression for zinc justified some remedial measures, and if governed by basic conditions and the statistical position of the metal, the whole machinery of the industry should be benefited by the action. For several weeks past the price of Prime Western for prompt delivery has been 6.20c East St. Louis and 6.55c New York. Future deliveries were held at a slight premium most of the month, but lately third quarter shipments were offered at 6.20c St. Louis, although leading producers were quoting 6.25c for July, August and September deliveries. Business was quiet in the past month, but a better inquiry is expected in August.

TIN

The dynamic possibilities of the tin market are proverbial. Recent developments have demonstrated this forcibly by the numerous price fluctuations recorded both here and abroad. It has been a difficult market to gauge owing to many cross-currents which operated lately to confuse consumers and speculators alike. Buying and trading, however, go on more or less actively, their commitments being governed by either necessity or sentiment. Bulls and bears have been engaged in strenuous combat for many months. Bearish tactics have been encouraged by increased production and abnormally high prices. Bear arguments have been singularly effective, and values declined sharply. The low point in several years was touched early in July with business reported at 45.30c for Straits deliverable in October. There was distinct improvement later in the month on signs of good support and

bear covering. Tin consumption is large in this country, and there are indications that tin plate production may make a new high record this year. American deliveries for the first half of this year amounted to 38,460 tons as compared with 37,330 tons in the first half of last year. Total visible supply on July 1 was 16,231 tons, against 17,064 tons on June 1, a decrease of 833 tons. The market at close of this report quoted 47½c to 48c for August delivery of Straits tin, showing a considerable gain over recent low figures.

LEAD

Buying of lead in July was on a fairly active scale. Consuming interest was stimulated early in the month by a reduction in price from 6.30c to 6.20c New York basis, with the St. Louis position quoting 6c. Purchases were mostly for nearby delivery, consumers preferring to postpone broad buying for future shipment until the outlook is more definite or requirements more urgent. Consumption in this country is very good indeed and leading industries in all sections are preparing for an active fall and winter in their respective fields. Good scale buying was noted at the month-end and the tone of the market was firm. The month terminated with good demand, and conditions appeared favorable for further activity.

ALUMINUM

Demand for aluminum is good and a large tonnage is going into consumption. Exceptional activity in the automotive industry makes big volume deliveries of the metal a necessity. Price situation remains firm at 24.30c for 99% plus and 22.30c for 94% plus grade. The imported article is also firm at full prices. Bonded stocks at last reports were the lowest in eleven months.

ANTIMONY

A firm and active market for antimony developed recently. All positions commanded better prices than earlier in the month. Light shipments from China in June are expected to make for rather more or less tension in the August position. Consuming demand was only moderately active most of the past month, but dealers were buyers of considerable quantities. Recent sales of Chinese regulus 99% fine were made at 9¼c for spot and nearby delivery, duty paid, and 9¾c for futures. Stocks of antimony in this country were recently 2,626,153 pounds carried in bonded warehouses on June 1. They are said to be strongly held for most part and not likely to be pressed on the market.

QUICKSILVER

A fair amount of business was done for current requirements, but prices showed a declining tendency in July both here and in London. Consumers were confining purchases to small quantities on the basis of $121.50 to $123 per flask.

PLATINUM

Demand has been within moderate limits for several weeks past and supplies are equal to all requirements. The price, however, remains steady at $76 per ounce for refined platinum.

SILVER

The month of July witnessed a series of irregular price movements in the silver market. There was no great activity reported sufficient to produce wide variations in quotations. Chinese operators bought and sold to a moderate extent, switching from one position to another according to speculative dictates. India was a buyer from time to time on a moderate scale when the market developed an easier trend.

Present price of silver bullion in New York is quoted 59¼ cents per ounce.

OLD METALS

There was a good movement of scrap copper last month, but a substantial quantity was on old contracts. Prices remained firm, with the copper grades in strong position. Buyers, however, were inclined to limit requirements to nearby delivery. Trading in lead grades was slow, with free offerings in excess of orders. Exporters continue interest in shipments of heavy and light copper. German demand was specially important. Dealers' buying prices were quoted at 12¼c to 12½c for heavy copper, 10¾c to 11¼c for light copper, 7¼c for heavy brass, 5¾c to 6c for light brass, 10c to 10¼c for new brass clippings, 4½c to 4¾c for heavy lead, 3¼c for old zinc, and 17¼c to 17½c for aluminum clippings.

Daily Metal Prices for the Month of July, 1928

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	2	3	4*	5	6	9	10	11	12	13	16	17	18
Copper c/lb. Duty **Free**													
Lake (Delivered)	14.875	14.875	.....	14.875	14.875	14.875	14.875	14.875	14.875	14.875	14.875	14.875	14.875
Electrolytic (f. a. s. N. Y.)	14.75	14.75	.....	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75
Casting (f. o. b. N. Y.)	14.40	14.40	.....	14.40	14.40	14.40	14.40	14.375	14.375	14.375	14.375	14.35	14.35
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.													
Prime Western	6.20	6.20	.....	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20
Brass Special	6.30	6.30	.....	6.30	6.30	6.30	6.30	6.30	6.35	6.35	6.35	6.35	6.35
Tin (f. o. b. N. Y.) c/lb. Duty **Free**													
Straits	46.125	46.25	.....	46.125	46.125	46.375	46.375	46.375	46.00	46.25	46.25	47.25	47.875
Pig 99%	45.75	45.625	.....	45.50	45.50	45.625	45.625	45.625	45.00	45.75	45.75	46.625	47.25
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	6.15	6.15	.....	6.15	6.15	6.125	6.10	6.10	6.05	6.05	6.05	6.00	6.00
Aluminum c/lb. Duty 5c/lb.	24.30	24.30	.....	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30
Nickel c/lb. Duty 3c/lb													
Ingot	35	35	.....	35	35	35	35	35	35	35	35	35	35
Shot	36	36	.....	36	36	36	36	36	36	36	36	36	36
Electrolytic	37	37	.....	37	37	37	37	37	37	37	37	37	37
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	9.50	9.375	.....	9.375	9.50	9.50	9.50	9.75	9.50	9.50	9.50	9.50	9.50
Silver c/oz. Troy Duty **Free**	59.625	59.375	.....	59.125	59.25	58.875	58.875	59.00	59.25	59.125	59.00	58.875	58.875
Platinum $/oz. Troy Duty **Free**	76	76	.....	76	76	76	76	76	76	76	76	76	76

	19	20	23	24	25	26	27	30	31	High	Low	Aver.
Copper c/lb. Duty **Free**												
Lake (Delivered)	14.875	14.875	14.875	14.875	14.875	14.875	14.875	14.875	14.875	14.875	14.875	14.875
Electrolytic (f. a. s. N. Y.)	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75
Casting (f. o. b. N. Y.)	14.35	14.35	14.35	14.35	14.35	14.35	14.35	14.35	14.35	14.40	14.35	14.365
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20
Brass Special	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.30	6.334
Tin (f. o. b. N. Y.) c/lb. Duty **Free**												
Straits	47.625	47.50	47.625	48.00	49.00	48.375	48.00	47.875	47.75	49.00	46.00	48.523
Pig 99%	47.125	46.875	47.00	47.25	48.00	47.625	47.25	47.00	47.00	48.00	45.00	46.416
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.15	6.00	6.051
Aluminum c/lb. Duty 5c/lb.	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30	24.30
Nickel c/lb. Duty 3c/lb												
Ingot	35	35	35	35	35	35	35	35	35	35	35	35
Shot	36	36	36	36	36	36	36	36	36	36	36	36
Electrolytic	37	37	37	37	37	37	37	37	37	37	37	37
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	9.50	9.50	9.50	9.625	9.625	9.625	9.625	9.625	9.875	9.875	9.375	9.553
Silver c/oz. Troy Duty **Free**	58.875	58.875	59.625	59.50	59.50	59.75	59.875	59.25	59.375	59.875	58.875	59.227
Platinum $/oz. Troy Duty **Free**	76	76	76	76	76	76	76	76	76	76	76	76

*Holiday.

Metal Prices, August 6, 1928

NEW METAL

Copper: Lake, 14.87½. Electrolytic, 14.75. Casting, 14.35.
Zinc: Prime Western, 6.25. Brass Special, 6.40.
Tin: Straits, 46.125. Pig, 99%, 45.50.
Lead: 6.00. **Aluminum,** 24.30. **Antimony,** 9.875.
Nickel: Ingot, 35. Shot, 36. Elec., 37. Pellets, 40.
Quicksilver: flask, 75 lbs., $122.00. **Bismuth,** $1.70.
Cadmium, 75. **Cobalt,** 97%, $2.60. **Silver,** oz., Troy, 58.75.
Gold: oz., Troy, $20.67. **Platinum,** oz., Troy, $76.00.

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	10 to11¼
Brass Ingots Red	12 to13½
Bronze Ingots	12½to16
Casting Aluminum Alloys	21 to24
Manganese Bronze Castings	24 to40
Manganese Bronze Ingots	12½to16½
Manganese Bronze Forging	32 to42
Manganese Copper, 30%	25 to35
Monel Metal Shot	28
Monel Metal Blocks	28
Parsons Manganese Bronze Ingots	16½to19¾
Phosphor Bronze	14 to16
Phosphor Copper, guaranteed 15%	18 to21
Phosphor Copper, guaranteed 10%	17 to20
Phosphor Tin, no guarantee	60 to70
Silicon Copper, 10%, according to quantity	28 to32

OLD METALS

Buying Prices		Selling Prices
12¼to12¾	Heavy Cut Copper	13¾to14
12 to12½	Copper Wire	13 to13¼
10 to10½	Light Copper	11¾to12¼
10 to10¼	Heavy Machine Composition	11 to11½
7¾to 8	Heavy Brass	9¼to 9½
6½to 6¾	Light Brass	8 to 8¼
7¾to 8	No. 1 Yellow Brass Turnings	9¼to 9¾
9¼to 9½	No. 1 Composition Turnings	10¾to11
5½to 5¾	Heavy Lead	6¾to 7
3½to 3¾	Zinc Scrap	4¾to 5¼
8 to10	Scrap Aluminum Turnings	12½to14¼
13 to13½	Scrap Aluminum, cast alloyed	17½to18½
19 to20	Scrap Aluminum, sheet (new)	22 to22½
35 to37	No. 1 Pewter	41½to43½
11½	Old Nickel Anodes	13½
17½	Old Nickel	19½

Wrought Metals and Alloys

COPPER SHEETS

Mill shipment (hot rolled	23½c. to 24½c. net base
From stock	24½c. to 25½c. net base

BARE COPPER WIRE

16⅜c. to 16⅝c., net base, in carload lots.

COPPER SEAMLESS TUBING

25c. to 26c. net base.

SOLDERING COPPERS

200 lbs. and over in one order	22c. net base
100 lbs. to 200 lbs. in one order	22½c. net base

ZINC SHEET

Duty sheet, 15%	Cents per lb.
Carload lots, standard sizes and gauges, at mill, less 8 per cent discount	9.25 net base
Casks, jobbers' price	9.75 net base
Open casks, jobbers' price	10.25 to 10.50 net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base price, ton lots	33.30c.
Aluminum coils, 24 ga., base price, ton lots	31.00c.

ROLLED NICKEL SHEET AND ROD

Net Base Prices

Cold Drawn Rods	53c.	Cold Rolled Sheet	60c.
Hot Rolled Rods	45c.	Full Finished Sheet	52c.

BLOCK TIN SHEET

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 10½c. over Pig Tin; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 17c. over; less than 25 lbs., 25c. over.

SILVER SHEET

Rolled sterling silver 60¾c. to 62¾c. per ounce, Troy.

BRASS MATERIAL—MILL SHIPMENTS

In effect May 25, 1928
To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.19¼	$0.20¾	$0.22¾
Wire	.19¾	.21¼	.23¼
Rod	.17	.21½	.23½
Brazed tubing	.27¼	.....	.32½
Open seam tubing	.27¼	.....	.32½
Angles and channels	.30¼	.....	.35½

For less than 5,000 lbs. add 1c. per lb. to above prices.

BRASS SEAMLESS TUBING

24½c. to 25⅛c. net base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	21¼c. net base
Muntz or Yellow Metal Sheathing (14"x48")	19¼c. net base
Muntz or Yellow Rectangular sheet other Sheathing	20¼c. net base
Muntz or Yellow Metal Rod	17¼c. net base

Above are for 100 lbs. or more in one order.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Sheet Metal		Wire and Rod	
10% Quality	27 c.	10% Quality	30 c.
15% Quality	28½c.	15% Quality	33¾c.
18% Quality	29¾c.	18% Quality	37 c.

MONEL METAL, SHEET AND ROD

Hot Rolled Rods (base)	35	Full Finished Sheets (base)	42
Cold Drawn Rods (base)	40	Cold Rolled Sheets (base)	50

BRITANNIA METAL SHEET

No. 1 Britannia—18" wide or less, No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. to 500 lbs., 10c. over; 50 to 100 lbs., 15c. over; 25 to 50 lbs., 20c. over; less than 25 lbs. 25c. over. Prices f. o. b. mill.

Supply Prices, August 6, 1928

ANODES

Copper: Cast ..... 21¾c. per lb.
Rolled, oval ..... 21⅜c. per lb.
Rolled, sheets, trimmed ..... 22⅝c. per lb.
Brass: Cast ..... 22¾c. per lb.
Zinc: Cast ..... 12 c. per lb.

Nickel: 90-92% ..... 45c. per lb.
95-97% ..... 47c. per lb.
99% ..... 49c. per lb.
Silver: Rolled silver anodes .999 fine are quoted from 62¾ to 64¾c., Troy ounce, depending upon quantity.

FELT POLISHING WHEELS WHITE SPANISH

Diameter	Thickness	Under 100 lbs.	100 to 200 lbs.	Over 200 lbs.
10-12-14 & 16"	1" to 3"	$3.00/lb.	$2.75/lb.	$2.65/lb.
6-8 & Over 16	1 to 3	3.10	2.85	2.75
6 to 24	Under ½	4.25	4.00	3.90
6 to 24	½ to 1	4.00	3.75	3.65
6 to 24	Over 3	3.40	3.15	3.05
4 up to 6	¼ to 3	4.85	4.85	4.85
4 up to 6	Over 3	5.25	5.25	5.25
Under 4	¼ to 3	5.45	5.45	5.45
Under 4	Over 3	5.85	5.85	5.85

Grey Mexican Wheel deduct 10c per lb. from White Spanish prices.

COTTON BUFFS

Full Disc Open buffs, per 100 sections.

12" 20 ply 64/68 Unbleached	$31.00
14" 20 ply 64/68 Unbleached	39.95
12" 20 ply 80/92 Unbleached	33.05
14" 20 ply 80/92 Unbleached	44.80
12" 20 ply 84/92 Unbleached	42.50
14" 20 ply 84/92 Unbleached	57.60
12" 20 ply 80/84 Unbleached	38.35
14" 20 ply 80/84 Unbleached	52.00
Sewed Pieced Buffs, per lb., bleached	45-70c.

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.12-.17
Acid—Boric (Boracic) Crystals	lb.	.08½
Chromic, 75 and 125 lb. drums	lb.	.21-.22
Hydrochloric (Muriatic) Tech., 20°, Carboys	lb.	.02
Hydrochloric, C. P., 20 deg., carboys	lb.	.06
Hydrofluoric, 30%, bbls.	lb.	.08
Nitric, 36 deg., carboys	lb.	.06
Nitric, 42 deg., carboys	lb.	.07
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl	lb.	.17¾-.22¼
Denatured, drums	gal.	.45-.53
Alum—Lump, Barrels	lb.	.03¼
Powdered, Barrels	lb.	.039
Aluminum sulphate, commercial tech.	lb.	.02⅜
Aluminum chloride, solution in carboys	lb.	.06½
Ammonium—Sulphate, tech., bbls.	lb.	.03¾
Sulhpocyanide	lb.	.65
Arsenic, white, kegs	lb.	.05
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Borax Crystals (Sodium Biborate), bbls.	lb.	.04½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls.	lb.	.28
Chromic Sulphate	lb.	.37
Copper—Acetate (Verdigris)	lb.	.23
Carbonate, bbls.	lb.	.16-.17
Cyanide (100 lb. kegs)	lb.	.50
Sulphate, bbls.	lb.	.06
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$70.00
Fusel Oil	gal.	$4.45
Gold Chloride	oz.	$14.00
Gum—Sandarac	lb.	.26
Shellac	lb.	.59-.61
Iron Sulphate (Copperas), bbl.	lb.	.01½
Lead Acetate (Sugar of Lead)	lb.	.13¼
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Nickel—Carbonate, dry, bbls.	lb.	.29
Chloride, bbls.	lb.	.18
Salts, single, 300 lb. bbls.	lb.	.10½
Salts, double, 425 lb. bbls.	lb.	.10
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash, Caustic Electrolytic 88-92% broken, drums	lb.	.09
Potassium Bichromate, casks (crystals)	lb.	.09
Carbonate, 96-98%	lb.	.06¾-.07
Cyanide, 165 lb. cases, 94-96%	lb.	.57½
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.05½
Silver Chloride, dry, 100 oz. lots	oz.	.49½-.54¼
Cyanide (fluctuating)	oz.	.57-.66
Nitrate, 100 ounce lots	oz.	.42¾-.51½
Soda Ash, 58%, bbls.	lb.	.02½
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.19
Hyposulphite, kegs	lb.	.04
Nitrate, tech., bbls.	lb.	.04¼
Phosphate, tech., bbls.	lb.	.03¾
Silicate (Water Glass), bbls.	lb.	.02
Sulpho Cyanide	lb.	.32½
Sulphur (Brimstone), bbls.	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.37-.38
Tripoli, Powdered	lb.	.03
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.00
Zinc, Carbonate, bbls.	lb.	.11
Chloride, casks	lb.	.06¾
Cyanide (100 lb. kegs)	lb.	.41
Sulphate, bbls.	lb.	.03¾